411 4th Avenue
Fairbanks, AK 99701
Phone: (907) 474-2011
Fax: (907) 474-2001

www.allalaskagasline.com

Appendix NN - RR

Binder 12

AGIA License Application
November 30, 2007

THIS PAGE CONTAINS PROPRIETARY OR TRADE SECRET INFORMATION THAT IS CONFIDENTIAL TO THE PORT AUTHORITY, WHO REQUESTS THAT THE INFORMATION BE KEPT CONFIDENTIAL AND EXEMPT FROM PUBLIC DISCLOSURE TO THE EXTENT PROVIDED IN AS 43.90.150 & AS 43.90.160

Appendix NN

Financial Model

THIS PAGE CONTAINS PROPRIETARY OR TRADE SECRET INFORMATION THAT IS CONFIDENTIAL TO THE PORT AUTHORITY, WHO REQUESTS THAT THE INFORMATION BE KEPT CONFIDENTIAL AND EXEMPT FROM PUBLIC DISCLOSURE TO THE EXTENT PROVIDED IN AS 43.90.150 & AS 43.90.160

- Confidential -

Contents

1.0 Overview 5

2.0 Permit Acquisition Process 7

2.1 General Discussion 7

2.2 Applicable Statutes, Regulations, and Ordinances 7

2.2.1 Major Laws and Regulations Applicable to Enabler Project 8

2.2.2 Major Regulations Applicable to a Y-Leg Through Canada 9

2.3 Key Agencies and Jurisdictions in Alaska 11

2.3.1 Federal 11

2.3.1.1 Federal Energy Regulatory Commission (FERC) 11

2.3.1.2 Bureau of Land Management (BLM) 12

2.3.1.3 US Army Corps of Engineers (USACE) 12

2.3.1.4 US Fish and Wildlife Service (USFWS) 13

2.3.1.5 NOAA Fisheries Service (NMFS) 13

2.3.1.6 US Environmental Protection Agency (EPA) 14

2.3.1.7 US Coast Guard (USCG) 15

2.3.1.8 NOAA Ocean and Coastal Resource Management (OCRM) 15

2.3.1.9 Federal Advisory Council of Historic Preservation (ACHP) 16

2.3.2 State 16

2.3.2.1 Regulatory Commission of Alaska (RCA) 16

2.3.2.2 Alaska Department of Natural Resources (ADNR) 16

2.3.2.3 Alaska Department of Environmental Conservation (ADEC) 17

2.3.2.4 State Fire Marshal 17

2.3.2.5 State Historic Preservation Office (SHPO) 17

2.3.2.6 Alaska Department of Fish and Game (ADF&G) 20

2.3.3 Local 22

2.3.3.1 North Slope Borough 22

2.3.3.2 Fairbanks North Star Borough 22

2.3.3.3 City of Delta Junction 22

2.3.3.4 City of Valdez 22

2.3.4 Native, Tribal or Aboriginal 22

2.3.4.1 Arctic Slope Regional Corporation (ASRC) 22

2.3.4.2 Doyon Limited 22

2.3.4.3 Ahtna Inc. 22

2.4 Required Permits and Approvals 23

2.4.1 YPC Permits and Approvals 24

2.4.2 Pipeline 25

2.4.2.1 FERC (Certificate) 25

2.4.2.2 BLM (right-of-way on federal land, engineering design review, material sales on federal land, EIS cooperating agency) 29

2.4.2.3 USACE (Section 404 and Section 10 permits) and USCG (Section 9 permits) 29

2.4.2.4 USEPA (NPDES Permits) 29

2.4.2.5 USFWS (ESA approval) 30

2.4.2.6 NOAA Fisheries (ESA approval, EFH approval) 30

2.4.2.7 ADNR (right-of-way on state land, land use permits, material sales on state land, fish habitat permit, ACMP, water use permits, engineering design review) 30
2.4.2.8 SHPO (NHPA approval) 30
2.4.2.9 North Slope Borough, Fairbanks North Star Borough, City of Delta Junction, City of Valdez (local zoning permits) 30
2.4.2.10 ADEC (PSD and Title V air permits, oil spill contingency plan – ODPCP, solid waste disposal permits, water quality certification) 31
2.4.3 LNG Plant 31
2.4.3.1 FERC (Authorization) 31
2.4.3.2 USACE (Section 10 and 404 permit) 31
2.4.3.3 USEPA (NPDES permits) 32
2.4.3.4 USFWS (ESA approval) 32
2.4.3.5 NOAA Fisheries (ESA approval, EFH approval) 32
2.4.3.6 ADEC (PSD and Title V air permits, oil spill contingency plan – ODPCP, solid waste disposal permits, water quality certification) 32
2.4.3.7 SHPO (NHPA approval) 33
2.4.3.8 USCG (WSA approval and ROD) 33
2.4.3.9 ADNR (land lease, fish habitat permit, ACMP) 33
2.5 NEPA Process and Lead Agency 33
2.6 Permitting Interdependencies 34
2.6.1 NEPA Agencies 34
2.6.1.1 FERC 34
2.6.1.2 BLM 34
2.6.1.3 USACE 34
2.6.1.4 USEPA 34
2.6.1.5 USFWS 35
2.6.1.6 NOAA Fisheries 35
2.6.1.7 ADNR 35
2.6.2 Certifications 35
2.6.2.1 401 Water Quality 35
2.6.2.2 Alaska Fire Marshal plan approvals 35
3.0 Permit Streamlining 36
3.1 FERC Pre-filing Process 36
3.2 Use of Nationwide Permits 36
3.3 Joint Pipeline Office 36
4.0 Permitting Schedule 38
4.1 Initial Submittals 38
4.2 Subsequent Submittals 38
4.3 Specific Permitting Sequence 39
4.4 Key Milestones 40
4.5 Overall Timeline 41
4.6 Critical Path and Potential Sources of Delay 41
5.0 Management of the Permitting Process 42

List of Tables

Table 2-1 Environmental Permits/Approvals Potentially Required for the Canada Leg of the Project 10
Table 2-2 List of Required Permits and Approvals for US Facilities 23

Figure

Figure 2.3.1 Cultural Resource Process Schematic 21

1.0 Overview

Pursuant to AS 43.90.120, the Commissioner of Natural Resources and the Commissioner of Revenue, acting jointly (Commissioners), have commenced a public process to request Applications for a License as authorized by the Alaska Gasline Inducement Act (AGIA), AS 43.90.010 et seq. The Request for Applications (RFA) requires a Regulatory Plan be prepared in accordance with section 2.2.4 of the RFA. Capitalized terms not defined in this Appendix shall have the meaning given them in the Application.

Pursuant to the RFA, this Regulatory Plan is to include a section on Regulatory Approvals (2.2.4.1) which "must provide a list and explanation of all major regulatory approvals required for its proposed project (e.g., certificates of public convenience and necessity), including federal, state, Canadian and any other required approvals." The Regulatory Plan must also contain a section which "should provide a list and explanation of all major rights-of-way, authorizations, and related approvals required for its proposed project, and describe the plan for obtaining these authorizations. This should include both U.S. and Canadian rights-of-way authorizations and any tribal or aboriginal authorizations."

Section 2.2.4 requires a description of whether the project meets the qualification criteria of Section 103 of the Alaskan Natural Gas Pipeline Act of 2004 (ANGPA). Section 103 authorizes the Federal Energy Regulatory Commission (FERC) to consider and act on an application for the issuance of a certificate of public convenience and necessity for the construction and operation of an "Alaskan natural gas transportation project." Since the Project is not a line through Canada it is not an "Alaskan natural gas project" within the meaning of Section 102(2).

Nonetheless the Owner foresees holding an open season consistent with FERC's Order No. 2005 including regulations applicable to future expansions. The Owner will undertake a study of Alaska in-State needs, including tie-in points along the Alaska natural gas transportation project for in-State access. The Owner will provide at least five tie-in points along the pipeline, which will consist of installing valve connections and/or metering stations. Beyond these points, third parties will be responsible for permitting and installing gas pipeline distribution systems for in-State use of natural gas.

In addition, the Regulatory Plan must provide commitments for compliance with either a FERC-Certificated Project (2.2.4.3) or a Regulatory Commission of Alaska (RCA) Certificated Project (2.2.4.4). Under either of these certification processes, the applicant must set a date certain that is not later than 36 months after the issuance of the AGIA License, by which the applicant will conclude a binding open season that is consistent with the requirements of the applicable certification process. In addition, the applicant must set a date certain by which it will apply for a certificate of public convenience and necessity from the appropriate federal or state regulatory agency. The dates certain must be set forth in the application and be consistent with the schedules submitted for the proposed project. If an applicant also proposes to enter Canada with a pipeline as part of this application, they must also address Canadian regulatory requirements (2.2.3.5) within the Regulatory Plan. The necessary commitments are made in the main body of the Application. This Regulatory Plan assumes certification from the FERC for both the LNG Facilities and Pipeline.

The Project requires regulatory approvals, authorizations, and permits from a variety of federal, state, and local agencies. In addition, the subsequent Canadian section of a later Y-leg along the Alaska Highway would require comparable federal and provincial approvals in Canada. The regulatory approval process in the U.S. will drive the overall development schedule and define the Project's critical path. As such, it is important for the permitting process to be fully understood and taken into account in the early planning phases of the Project and in scheduling. Both regulatory planning and engineering design activities need to be attentive to the heavily front-loaded informational requirements of the regulatory approval process in order for the Project to achieve its aggressive development milestones and begin construction in 2012 and support gas deliveries in 2017.

This Regulatory Plan is key to the success of the Project and reflects the regulations that apply to various Project elements, the overall pipeline delivery system and the regulatory review process that the jurisdictional agencies will follow. The Plan is prepared to meet the requirements of Section 2.2.4 of the RFA, and to provide a roadmap for development of permit applications during the Front End Engineering Design (FEED) and subsequent stages of Project execution.

The sections of the Regulatory Plan that follow describe the general permit acquisition process, identify applicable statues and regulations, identify key agencies and jurisdictions, and describe required permits and approvals by project component.

Although much is known about environmental resources and land uses in the utility corridor from Prudhoe Bay to Valdez, planning and permitting needs for the Project will require existing data to be updated and expanded. The general studies necessary to support design and permitting of the Alaska Infrastructure system are discussed in the Environmental Management sections of the Project's Execution Plan, which are provided elsewhere in this Application.

2.0 Permit Acquisition Process

2.1 General Discussion

Major projects of the magnitude proposed in this application, by their very nature, cross many regulatory and administrative jurisdictions and diverse land ownerships, resulting in a myriad of regulatory and environmental permits and approvals from many agencies and other stakeholders representing national, state, local, and Alaska Native interests.

The regulatory approvals can be broadly classed into three categories:

- Project Sanctioning Permits and Approvals;
- Project Construction Permits and Approvals; and
- Project Operating Permits and Approvals.

Project sanctioning permits and approvals include major governmental authorizations such as Certificates of Public Convenience and Necessity, the grant or issuance of rights-of-way (ROW) across federal or state lands and other regulatory approvals that have the effect of sanctioning a major project. These project sanctioning permits and approvals typically include the preparation of an Environmental Impact Statement, and the issuance of a Record of Decision (ROD). Project sanctioning permits or approvals *may confer* project specific approvals for the work to proceed or they may defer approval of the start of project construction to subsequent Notice to Proceed (NTP) processes *or to permits* specifically authorizing construction.

Project construction permits and approvals are those which are granted by governmental agencies that generally follow the sanctioning of the project. Construction permits authorize work to proceed on specific components of the overall project, such as construction of access roads or pads for facilities, mining gravel and crossing streams with construction equipment. Such construction permits are normally site specific and may require multiple permits of a given type to cover all like activities over a geographically dispersed project like the Project. A project of the magnitude covered by this application will typically have hundreds of construction related permits issued from federal, state, local, and tribal governments.

Operating permits and approvals are those that are required after the construction of a project, which are necessary for the continued operation of project components through the life of the project. These operating permits typically authorize the release of a regulated pollutant such as air emissions and wastewater discharges.

2.2 Applicable Statutes, Regulations, and Ordinances

In response to Section 2.2.4.1 of the RFA, the Owner is providing the following preliminary listing of major regulatory approvals required for the Project. The listing *includes requirements* for the Project, the pipeline from Prudhoe Bay to a point near Valdez on Prince William Sound, and the LNG plant and Marine terminal at Anderson Bay, as well as a potential "build out" for the addition of a "Y-leg" to deliver additional gas volumes to Canada along the Alaska Highway. A gas conditioning plant at Prudhoe Bay will be built by others and is not part of this Project. This Project will start at custody transfer as the gas leaves the gas conditioning plant.

2.2.1 *Major Laws and Regulations Applicable to Enabler Project*

Federal Energy Regulatory Commission (FERC)

Alaska Natural Gas Pipeline Act of 2004
Natural Gas Act of 1938, as amended, Section 7(c)
Natural Gas Act of 1938, as amended, Section 3(e)
Natural Gas Act of 1938, as amended, Sections 15(b) and 15(c)
Energy Policy Act of 2005
National Environmental Policy Act of 1969 (all Federal agencies)
18 CFR 153
18 CFR 157
18 CFR 375
18 CFR 380

U.S. Department of Energy, Office of Natural Gas Regulatory Activities (DOE)

Natural Gas Act of 1938, as amended, Section 3

U.S. Department of the Interior, Bureau of Land Management (BLM)

Mineral Leasing Act of 1920, as amended, Title 30.185
Federal Land Policy and Management Act of 1976, as amended, Title 43.35
Materials Act of 1947, as amended, Title 43.3610

U.S. Army Corps of Engineers (USACE)

Clean Water Act, as amended, Section 404
Rivers and Harbors Act of 1899, as amended, Section 10

U. S. Environmental Protection Agency (EPA)

Clean Water Act, as amended, Section 311 and Section 402
Clean Air Act, as amended, Title 42 Chapter 85
Resource Conservation and Recovery Act, as amended, Title 42 Chapter 82
Oil Pollution Act of 1990

U. S. Coast Guard (USCG)

Rivers and Harbors Act of 1899, as amended, Section 9
Navigation and Vessel Inspection Circular (NVIC) 05-05

33 C.F.R. Part 127

Executive Order 10173

International Ship and Port Facility Security Code

U.S. Department of the Interior, *Fish and Wildlife Service* (USFWS)

Endangered Species Act of 1973, as amended, Section 7
Marine Mammals Protection Act, as amended, Section 101
Fish and Wildlife Coordination Act, as amended

National Oceanic and Atmospheric Administration (NOAA), Fisheries Service (NMFS) and Office of Ocean and Coastal Resource Management (OCRM)

Endangered Species Act of 1973, as amended, Section 7
Marine Mammals Protection Act, as amended, Section 104
Fish and Wildlife Coordination Act, as amended
Magnuson-Stevens Act, Section 305(b)(2)

Coastal Zone Management Act

U.S. Department of the Interior, National Park Service (NPS)

National Historic Preservation Act of 1966, as amended, Section 106

U.S. Department of Transportation, Office of Pipeline Safety (OPS)

Pipelines and Hazardous Materials Safety Regulations, 49 CFR, Parts 192 and 193

Alaska Department of Natural Resources (ADNR)

Alaska Right-of-Way Leasing Act, Alaska Statute (AS) AS 38.35,
Alaska Coastal Management Program, as amended, 11 AAC 110,
Alaska Gasline Inducement Act (AGIA), AS 43.90
Alaska Water Use Act, AS 46.15
Alaska Land Act, AS 38.05
Fishway Act, AS 41.14.840 and Anadromous Fish Act, AS 41.14.870

Alaska Department of Environmental Conservation (ADEC)

Air Quality Control, 18 AAC 50
Oil and Hazardous Substances Pollution Control, 18 AAC 75
Water Quality Standards, 18 AAC 70
Solid Waste Program, 18 AAC 60.205

2.2.2 Major Regulations Applicable to a Y-Leg Through Canada

The 200-mile Y-leg segment to be constructed from Delta Junction to Beaver Creek at the Canadian border will be subject to the same federal and state regulations as the Project from Prudhoe Bay to Valdez. The segment to be constructed in Alaska as well as the continuing segment to be built in Canada would be permitted and constructed by a party or parties other than the Owner (Others). The following is a discussion of the general permitting processes that Others would follow in authorizing the Canadian segment of the system.

The Canada leg of the pipeline must cross Yukon Territory and British Columbia Province and enter Alberta Province to interconnect with existing pipeline infrastructure. Permitting for this part of the project will include preparation and submittal of support information for the Canadian federal approval process through the National Energy Board (NEB), as well as support information for other federal and Province-specific permit applications. To determine whether the project should proceed, the NEB will review the project's economic, technical and financial feasibility, as well as its environmental and socio-economic impact and other attributes.

At the federal level in Canada, the environmental review of the project will be subject to the Canadian Environmental Assessment Act (CEAA) under the jurisdiction of the NEB, which will require an Environmental Impact Assessment (EIA) for the project. The primary goal is an acceptable CEAA decision and NEB approval of the project (Certificate of Public Convenience and Necessity), as well as other permit approvals. The typical NEB process for major projects requires approximately 9-12 months, but approvals for complex projects can require more time.

In addition to the NEB, many other regulatory boards and agencies at the federal and provincial levels will need to review the plans for the Canada leg, and many of these agencies will have their own applicable permits. Permit applications will include, among others, those for land use permits, land lease permits, water licenses, navigable water licenses, and fisheries authorizations. Examples of specific environmental permits that could be required are shown in Table 2-1.

Table 2-1 Environmental Permits/Approvals Potentially Required for the Canada Leg of the Project

Agency	Permit, Authorization and/or Notification
FEDERAL	
National Energy Board	Certificate of Public Convenience and Necessity or Order
National Energy Board	Plans, profiles, and books of reference
National Energy Board	Leave to Open
Transport Canada	Letter of Approval for work in or about a navigable watercourse
Fisheries and Oceans of Canada	Letter of advice and decision regarding likelihood of harmful alteration, disruption, or destruction (HADD) of fish habitat
Environment Canada	Permit related to the Species at Risk Act (SARA)
PROVINCIAL & TERRITORIAL	
➢ ***Yukon***	
Yukon Water Board	Water License
Department of Tourism and Culture, Heritage Branch	Archeological Sites Regulations Permit
Department of Environment, Conservation Officer Services	Habitat Protection Area (HPA), Permission for Activity
Department of Energy, Mines and Resources	Land Use Permit; Commercial Timber Permit or permit identified as priority harvest; Quarry lease
Department of Community Services, Protective Services	Burning Permit
First Nation Land Department	Authorization by affected First Nation
Department of Environment, Environmental Programs	Air Emissions Permit
➢ ***British Columbia***	
B.C. Land and Water	Application of Occupation and Use of Crown Land (series of permits)
B.C. Ministry of Forests	License to Cut; Burning Reference Number
B.C. Ministry of Water, Land and Air Protection	Permit/approval for changes in and about a stream
B.C. Ministry of Sustainable Resource Management – Archaeological Planning and Assessment Department	Heritage Conservation Act clearance
➢ ***Alberta***	
Alberta Sustainable Resource Development	Pipeline Agreement (PLA)
Alberta Environment	Notification under the Code of Practice for Pipelines and Telecommunication Lines Crossing a Water Body; notification or registration under the Codes of Practice for withdrawal of water for hydrostatic testing and release of water following hydrostatic testing; notification under the code of Practice for Watercourse Crossings

Other permits/approvals related to access to and work in/on highways, blasting, worker safety, hazardous materials transportation, zoning, construction, buildings, sanitation, waste handling, etc., also could be required, as well as local development permits.

To coordinate permitting such a complex project, it is possible that the NEB and other federal and provincial departments, boards, and agencies will enter into a cooperative (team permitting) arrangement. Such an arrangement, which should be encouraged, would provide for both the environmental assessment and a regulatory review (permitting). The four phases of the cooperative regulatory review process are anticipated to include:

- Preparation--Regulatory agencies and Others develop a common understanding and approach to evaluate the proposal to build the pipeline.
- Preliminary information package and applications--Regulatory agencies review the Y-leg proposal and determine whether a potential exists for significant environmental impact or public concern.
- Joint environmental impact assessment panel hearings coordinated with regulatory hearings--Major regulatory applications for most parts of the project are submitted by Others. Public hearings are held to listen to the views of the public about possible impacts. The public has an opportunity to voice any concerns and to influence that project.
- Completion of regulatory processes-- If regulatory approvals are given for the Y-leg pipeline project, licenses and permits will be issued that outline the conditions to be met. Others will make a decision whether to proceed with construction.

2.3 Key Agencies and Jurisdictions in Alaska

2.3.1 Federal

2.3.1.1 Federal Energy Regulatory Commission (FERC)

At the request of YPC FERC[1] in 1987 and DOE[2] in 1989 issued Declaratory Orders stating that FERC did not have Section 7 NGA jurisdiction over any aspect of the YPC export project, that FERC had Section 3 NGA jurisdiction over the siting, construction and operation of the LNG plant, and that FERC would not exercise Section 3 NGA jurisdiction over the Pipeline even if it had it. Among others things:

- FERC pointed out that selling and transporting gas beyond Alaska's border to a foreign country did not constitute interstate commerce within the meaning of the NGA;
- DOE approved YPC's export request;
- DOE exercised its "plenary" Section 3 NGA authority to prohibit YPC "from taking any action that would compel a change in the basic nature and general route of an ANGTA project or otherwise prevent or impair in any significant respect its expeditious construction and operation[,]" a condition that applies to all direct and support facilities of the Project, including the GCP, but not to the gas reserves;
- DOE limited FERC's jurisdiction over the LNG export project to facilities it shares with another project over which FERC has interstate commerce jurisdiction, such as a shared gas conditioning plant: "[FERC] shall only exercise [its delegated NGA] authority over the export project to the extent necessary to ensure that the shared facility is constructed and operated in accordance with FERC's regulations . . . [and] the FERC shall have no other authority over Yukon Pacific's export project, including its rates, except to the extent necessary to ensure that Yukon Pacific pays its part of the costs of any shared facilities."

---

[1] Yukon Pacific Corporation, 39 FERC ¶ 61,216 (1987). See also FERC's order denying rehearing, 40 FERC ¶ 61,164 (1987).

[2] Yukon Pacific Corporation, DOE Opinion and Order No. 350, "Order Granting Authorization to Export Liquefied Natural Gas From Alaska," 1 FE ¶ 70,529 (1989). See also "Order Denying Rehearing Requests and Modifying Prior Order for Purposes of Clarification," 1 FE ¶ 70,303 (1990).

Since it was nonjurisdictional for FERC, in 1988 the Bureau of Land Management (BLM) and U.S. Army Corps of Engineers (USACE) as lead agencies issued the Final Environmental Impact Statement (FEIS) for the YPC pipeline. In 1995 FERC approved Anderson Bay as the site for the Project's LNG Facilities.[3] The approval was based primarily upon the considerations and findings of the site's FEIS.[4]

Nonetheless the Owner conservatively assumes in the Application the FERC will have jurisdiction over the pipeline under NGA Section 3 and/or 7 and the LNG Plant under Section 3. The Owner also anticipates that the FERC will be the lead agency for issuing federal authorizations for the Project and for compliance with NEPA. FERC will implement its responsibilities under the NGA and NEPA, primarily through its regulations at 18 CFR 153 (applications for authorization to construct, operate, or modify facilities used for the export or import of natural gas), 18 CFR 157 (applications for certificates of public convenience and necessity and orders for permitting and approving abandonment under Section 7 of the Natural Gas Act), 18 CFR 375 (authorities related to the Pre-Filing Process), and 18 CFR 380 (regulations implementing the National Environmental Policy Act) and associated Orders (e.g., Orders 609, Landowner Notification; 665, Pre-Filing Process; and 687, Coordinating the Processing of Federal Authorizations). The US Department of Energy's Office of Fossil Energy, Office of Natural Gas Regulatory Activities will work in concert with FERC in issuing an Export License for that portion of ANS gas that may be exported to foreign markets.

2.3.1.2 Bureau of Land Management (BLM)

The BLM has jurisdiction for granting rights-of-way across Federal lands for oil and gas pipelines and related facilities, and for granting temporary permits to supplement those rights-of-way in connection with construction, operations, maintenance, and termination of pipelines. The Owner believes the Federal right-of-way granted to YPC in 1988 (see below), although in need of updating, is valid and will be used for the Pipeline. Nonetheless, it is expected that the BLM will coordinate with FERC in the preparation of an Environmental Impact Statement (EIS), or Supplemental EIS, and will act as a cooperating agency. The Application timeline also allows for enough time to have a new federal right-of-way issued should the YPC right-of-way not be usable.

In addition to the grant of right-of-way, it is anticipated that acting under authority of the Federal Land Policy and Management Act the BLM may issue additional permits and non-oil and gas rights-of-way across Federal lands and may grant other temporary uses on Federal lands in support of the Project. The Owner will also expect to purchase mineral materials, such as sand, gravel, soil, and rock from Federal lands, which may be used for construction and maintenance purposes under provisions of the Materials Act of 1947, 43 U.S.C. §§ 3610 and 3620).

Rights-of-way and related approvals for oil and gas pipelines on Federal lands in Alaska are administered by the BLM Authorized Officer.

2.3.1.3 US Army Corps of Engineers (USACE)

The Owner anticipates the need for multiple permits from the USACE, under Section 404 of the Clean Water Act, for the placement of fill and dredged materials in waters of the U.S. and adjacent wetlands during the construction of the pipeline and related facilities and the LNG facilities. Alaska has an abundance of wetlands, waterways, and other waters that may be considered waters of the U.S. that will be crossed or filled by the Project. While not all wetlands are subject to the USACE regulatory jurisdiction, it is believed that a majority of the wetlands encountered on this project will be jurisdictional and subject to permit approval. In addition, the project will cross many navigable rivers and other navigable waterbodies, which will require authorization under Section 10 of the Rivers and Harbors Act of 1899. Some project facilities may require dual authorization under both Acts. The Project's permit

---

[3] Yukon Pacific Company L.P., "Order Granting NGA Section 3 Authorization for the Siting, Construction, and Operation of LNG Facility," 71 FERC ¶ 61,197 (1995). See also "Order Denying Rehearing," 72 FERC ¶ 61,226 (1995).

[4] Yukon Pacific LNG Project, Final Environmental Impact Statement, FERC Office of Pipeline Regulation (1995).

applications will be processed under the USACE public review process, which will be coordinated and timed to coincide with the FERC's EIS process. The USACE has an extensive list of Nationwide permits which will be evaluated to see if any of them are applicable to portions of the project. In general, projects of the scale proposed in this application will exceed the applicable threshold limits of the USACE Nationwide permits in Alaska and therefore require the issuance of individual permits.

2.3.1.4 US Fish and Wildlife Service (USFWS)

All Federal agencies who undertake to authorize permits, approvals, or rights-of-way that may affect certain federally listed threatened or endangered species or their designated critical habitat, are required to enter into a consultation process under Section 7 of the Endangered Species Act with the U.S. Fish and Wildlife Service (USFWS). During this consultation process the USFWS will prepare a Biological Opinion and incidental take statement that will guide the other Federal agencies in their final decision process and development of mitigation. The Agency must make prescribed findings that the project will not jeopardize the continued survival of the listed species under its jurisdiction. The consultation process will run concurrently with and in coordination with the schedule established by FERC for the EIS process.

The USFWS manages the following listed endangered (E) and threatened (T) species in Alaska (several may be found in the Project's area).

USFWS Listed Species

Animals – 7

Status	*Species/Listing Name*
E	Albatross, short-tailed (*Phoebastria (=Diomedea) albatrus*) -- USFWS
E	Curlew, Eskimo (*Numenius borealis*) -- USFWS
T	Eider, spectacled (*Somateria fischeri*) -- USFWS
T	Eider, Steller's AK breeding pop (*Polysticta stelleri*) -- USFWS
T	Lynx, Canada & lower 48 States DPS (*Lynx canadensis*) -- USFWS
T	Otter, Northern Sea southwest Alaska DPS (*Enhydra lutris kenyoni*) -- USFWS
E	Sea turtle, leatherback (*Dermochelys coriacea*) -- USFWS

Plants – 1

Status	*Species/Listing Name*
E	Fern, Aleutian shield (*Polystichum aleuticum*) -- USFWS

The USFWS provides regulatory protection for polar bears, walrus, and sea otters under the Marine Mammals Protection Act (MMPA). The Service may issue Incidental Take Regulations and Letters of Authorization (LOA) under Section 101(a)(5)(A) of the MMPA to authorize the incidental, but not intentional, taking of small numbers of these marine mammals associated with specified activities, provided that, the total of such taking will have no more than a negligible impact on these species and does not have an unmitigable adverse impact on the availability of these species for subsistence uses. Where a species has dual listing under the Endangered Species Act (ESA), the ESA will take precedence.

All of the above consultations and authorizations will be undertaken by the Owner or the applicable federal agencies in coordination with the schedule established by FERC during the EIS process.

2.3.1.5 NOAA Fisheries Service (NMFS)

Much like interactions with the USFWS, Federal agencies must follow the same Section 7 consultation process with NMFS under the ESA for listed species under NMFS' regulatory jurisdiction. NMFS will

conduct a separate consultation process and issue a separate Biological Opinion from the one prepared by the USFWS. NMFS listed endangered (E) and threatened (T) species in Alaska include several species of Steller sea-lions and whales.

NMFS Listed Species

Animals – 5

Status	*Species/Listing Name*
T	Sea-lion, Steller eastern pop. (*Eumetopias jubatus*) -- NMFS
E	Sea-lion, Steller western pop. (*Eumetopias jubatus*) -- NMFS
E	Whale, bowhead (*Balaena mysticetus*) -- NMFS
E	Whale, finback (*Balaenoptera physalus*) -- NMFS
E	Whale, humpback (*Megaptera novaeangliae*) -- NMFS

NMFS provides regulatory protection for the following marine mammals under the Marine Mammals Protection Act: Cetaceans (whales, dolphins, and porpoises) and *Pinnipeds* (seals, sea lions, and walruses). Incidental Harassment Authorizations (IHA) may be granted for incidental take of small numbers of marine mammals by harassment or Letters of Authorization (LOA) for incidental commercial take of marine mammals may be granted by NMFS under Section 104 of the MMPA. If the species is also a listed species under the ESA, then the ESA takes precedence.

Federal and state agency actions, such as permit approvals, that may adversely affect Essential Fish Habitat (EFH) trigger consultations and/or recommendations under Sections 305(b)(2) to (4) of the Magnuson-Stevens Act. Under Section 305(b)(2), each federal agency must consult with NMFS regarding any action authorized by the agency that may adversely affect EFH. The EFH regulations require that federal agencies prepare EFH assessments as part of the consultation process to document anticipated effects to EFH (50 CFR 600.920[e]). Under Section 305(b)(4)(A), NMFS must provide EFH Conservation Recommendations to federal and state agencies regarding any action that would aversely affect EFH.

All of the above NMFS consultations and authorizations will be undertaken by the Owner or the applicable federal agencies in coordination with the schedule established by FERC during the EIS process.

2.3.1.6 US Environmental Protection Agency (EPA)

The Owner has determined that they will likely have water discharges during construction and operations of the project that will be subject to Clean Water Act permits issued under Section 402 under the permit program currently administered by the EPA as the National Pollutant Discharge Elimination System (NPDES). This will include NPDES permits for the discharge of hydrostatic wastewater, construction camp treated wastewater, and permanent facilities treated wastewater. In addition, storm water runoff will be authorized under NPDES Storm Water permits. The State of Alaska has applied to assume primacy of the NPDES program. Should their application be granted, the EPA will delegate permitting, compliance, and enforcement activities to the State, to be administered by the Alaska Department of Environmental Conservation (ADEC). During operations of the facilities the Owner will be required to prepare and implement Spill Prevention, Control and Countermeasures (SPCC) plans. SPCC Plans ensure that facilities put in place containment and other countermeasures that would prevent oil spills that could reach navigable waters. A spill contingency plan is also required as part of the SPCC Plan if a facility is unable to provide secondary containment (e.g., berms surrounding the oil storage tank). Spill contingency plans are administered by the ADEC.

2.3.1.7 US Coast Guard (USCG)

The Owner anticipates that the project will have several pipeline bridge crossings of navigable rivers which will require bridge permits under Section 9 of the Rivers and Harbors Act of 1899, administered by the United States Coast Guards (USCG).

For the LNG plant, the marine cargo transfer system and any appurtenances found between the LNG ships and the last valve immediately before the LNG storage tanks must comply with the USCG regulations for Liquefied Natural Gas Waterfront Facilities, 33 CFR Part 127 and Executive Order 10173. Part 127 regulates the design, construction, equipment, operations, personnel training, fire fighting, and security of LNG waterfront facilities.

The safety systems, including the communications systems, emergency shut down, gas detection, and fire protection systems, of the proposed facilities also will be subject to regulation under Part 127. In addition, the operations at the berth will be defined in various procedure manuals, including the operations and emergency procedures manuals, which will be reviewed and approved by the USCG, along with the maintenance and training manuals. Finally, because of its jurisdiction relative to the LNG Plant, the USCG will participate in preparing the marine safety section of the NEPA document.

The formal process with the USCG will be initiated by a Letter of Intent (LOI) from the Owner, submitted along with a Preliminary Waterway Suitability Analysis (WSA). The preliminary WSA must conform to the requirements published in June 2005 by the USCG, the final rule issued by FERC in October 2005 to implement the Energy Policy Act of 2005, and guidelines published by the FERC Office of Energy Projects (OEP) for resource reports in December 2005. The Follow-On WSA will be submitted to the USCG at the time of the FERC Application. The USCG will consider the conclusions in the follow-on WSA before issuing a letter of recommendation (LOR) for the LNG shipping at about the time the FERC publishes the Draft Environmental Impact Statement (DEIS).

Part of the WSA process, including consultation with the USCG and Port stakeholders, will involve an assessment of the consequences from vapor dispersion and thermal radiation from an LNG carrier breached by accident or by an intentional act. Enclosure 11 to the Navigational Vessel Information Circular, NVIC 05-05, published by the USCG in June 2005 (USCG 2005) adopts for purposes of this assessment "zones of concern," based on the consequence analysis guidance published in December 2004 by Sandia National Laboratories (SNL 2004). The preliminary WSA submitted by the Owner will propose to use the Sandia Report, as adopted in NVIC 05-05, as the basis for developing the Follow-On WSA. It is possible however, that site-specific modeling will be requested by the USCG.

The USCG has the responsibility under the International Ship and Port Facility Security Code (ISPS) to approve and issue an International Ship Safety Certificate (ISSC) for all US flagged vessels sailing on international routes. If the Project utilizes US flagged ships on international routes, the USCG would issue the ISSC during the process of registration and certification of the ship. For non-US flagged ships sailing on international routes, the flag registry for the country of registration would provide this certification in accordance with ISPS code requirements from the amended 1974 Safety of Life at Sea (SOLAS) convention of the International Maritime Organization (IMO, a United Nations organization). This certification process is independent of the Project's FERC lead regulatory process, and would be undertaken at a later date upon commissioning and certification of the LNG tankers utilized on the project.

2.3.1.8 NOAA Ocean and Coastal Resource Management (OCRM)

The provisions of the federal Coastal Zone Management Act of 1972 (CZMA) are administered in Alaska through the federally approved Alaska Coastal Management Program (ACMP) by the Alaska Department of Natural Resources (ADNR), Office of Project Management and Permitting (OPMP). Projects within the *defined coastal zone of Alaska that involve more than one state or federal permitting agency fall under a* coordinated review process administered by OPMP. This ACMP Coastal Consistency Review process involves a separate public notice process that will be coordinated with the FERC EIS public review process. At the conclusion of the Consistency Review, the State must determine whether the project is consistent with the ACMP standards or could be consistent if certain stipulations or conditions are implemented for the project. A Draft Consistency Determination is then issued. If the Owner does not object and accepts the stipulations or conditions of approval, then a Final Consistency Determination is issued 5 days later.

In 1988 the YPC project obtained a favorable determination that the general project scope was consistent with the standards of the ACMP. The Owner will either get that determination updated or have an entirely new one made. In the unlikely event that ADNR issues an updated or new Consistency Determination that the Owner finds unacceptable, it first has an appeal process within the State's regulations, but the Owner also has a further appeal process through the federal program which is administered by the U.S. Department of Commerce, National Oceanic and Atmospheric Administration (NOAA) under Section 319 of CZMA (16 USC § 1465).

2.3.1.9 Federal Advisory Council of Historic Preservation (ACHP)

The ACHP within the US Department of Interior has primary responsibility for overseeing compliance with the National Historic Preservation Act, and works closely with the lead federal agency of responsible state agencies to ensure consistency and effective integration of review processes.

The Alaska State Historic Preservation Officer (SHPO) administers the national historic preservation program at the state level in Alaska, reviews National Register of Historic Places nominations, maintains data on historic properties that have been identified but not yet nominated, and consults with federal agencies during Section 106 reviews under the National Historic Preservation Act of 1966. In the unlikely event that the Owner disagrees with the findings of the SHPO, they may appeal to the ACHP, which has federal oversight of the state administered program.

2.3.2 State

2.3.2.1 Regulatory Commission of Alaska (RCA)

The RCA regulates public utilities by certifying qualified providers of public utility and pipeline services; and ensuring that they provide safe and adequate services and facilities at just and reasonable rates, terms, and conditions. A public utility or pipeline carrier must obtain a RCA certificate of public convenience and necessity, which describes the authorized service area and scope of operations of the utility. A certificate may be issued only if the Commission finds the applicant to be fit, willing, and able to provide the utility service requested. The Commission regulates the rates, services, and practices of utilities that meet the criteria for a certificate of public convenience and necessity to provide service to the public for compensation. The RCA is the State of Alaska equivalent of the FERC and is distinguished by regulating intrastate pipeline systems as opposed to the interstate pipeline systems that FERC regulates. The Owner anticipates in this Application that the proposed system will be regulated by FERC rather than the RCA. It is also anticipated that any spur pipeline systems operated by third parties that connect to the Project and that provide instate delivery of natural gas will be regulated by the RCA.

2.3.2.2 Alaska Department of Natural Resources (ADNR)

The ADNR will be the lead state agency in approving the pipeline and LNG Facilities for the Project on state lands. The Owner will update the YPC rights-of-way on state lands under the provisions of AS 38.35, although as with the federal right-of-way this Application's timeline allows sufficient time for the Project to obtain an entirely new one. The ADNR will administer this update and subsequent construction and monitoring through its State Pipeline Coordinator's Office (SPCO) which is the lead state agency in the Joint Pipeline Office (JPO). In addition to pipeline rights-of-way on state lands, the ADNR will issue permits for land use, water use, and non-pipeline rights-of-way. ADNR will also conduct material sales of sand, gravel, soil, and rock extracted from state lands for use in construction and maintenance of the Project.

ADNR's Office of Habitat Management and Permitting will issue Title 41 Fish Habitat Permits for stream crossings, water withdrawals, or other activities involving fish habitat on the project.

ADNR's Office of Project Management and Permitting will conduct the Coastal Zone Consistency Review process under the ACMP.

2.3.2.3 Alaska Department of Environmental Conservation (ADEC)

The Owner anticipates that the project will require multiple air quality control permits for new stationary sources associated with the construction and subsequent operations of the pipeline compressor stations and LNG Facilities facilities. To the extent existing YPC air quality permits are insufficient, these permits will be requested from the ADEC under their delegation of authority from the federal Clean Air Act and state law in Title 44, Chapter 46, and Title 46, Chapter 3 and Chapter 14. Required air quality control permits include both construction permits and operating permits. In addition, during construction there may be numerous other air quality authorizations and permits to address temporary activities that may be necessary. *Sources emitting more than threshold amounts of criteria pollutants in air quality attainment* areas are required to obtain Prevention of Significant Deterioration (PSD) permits. The process for obtaining PSD permits can be a lengthy one. The Owner will initiate the process early to assure a coordinated review with the FERC EIS and certification process.

The ADEC has established industrial wastewater General Permits that may be applicable for the Project and be used for excavation dewatering and also for hydrostatic test water disposal (AS 46.03). In addition, ADEC must approve the design and operation of drinking water treatment systems, sewage treatment systems, food handling facilities, and waste disposal facilities (including incinerators) associated with temporary construction camps and also permanent facilities to be utilized for the Project.

Construction and or demolition wastes generated during Project construction or operations will be classified to determine if they are hazardous wastes or not in accordance with Title 18 of the Alaska Administrative Code, Chapter 62 (which adopts the federal hazardous waste regulations). Wastes that meet the definition of a hazardous waste or other specially regulated wastes such as universal wastes (batteries, lamps, pesticides, and mercury-containing equipment) will be managed appropriately in accordance with the regulations. These include proper on-site accumulation practices, use of licensed transporters, and disposition to properly licensed treatment, disposal, or recycling facilities.

The Project Owner plans to utilize existing permitted landfills for the disposal of solid wastes that cannot be recycled or otherwise put to beneficial use. In the event that it may be impracticable, due to logistics or other valid reasons, to utilize existing permitted land fills, the Owner may seek authorization from ADEC to construct and operate an approved inert waste land fill under 18 AAC 60.205.

It is anticipated that during the construction and subsequent operations of the Project that there may be fuel tank storage facilities at construction camps, compressor stations, and the LNG Facilities which will be subject to the evaluation, approval and regulatory compliance oversight of Oil Discharge Prevention and Contingency plans (ODPCP) submitted to ADEC for approval under AS 46.03, AS 46.04 and 18 AAC 75.

2.3.2.4 State Fire Marshal

The Alaska Department of Public Safety, Division of Fire and Life Safety is the State Building Official. The construction, repair, remodel, addition, or change of occupancy of any building/structure, or installation or change of fuel tanks must be approved by the Division of Fire and Life Safety before any work is started. The Plan Review Bureau conducts a review of building and construction plans to assure compliance with state fire and life safety codes and applicable building regulations before granting a plan review approval certificate.

2.3.2.5 State Historic Preservation Office (SHPO)

ADNR's Office of History and Archaeology, will issue SHPO approvals for cultural resource Field Survey Permits, approvals of cultural and archaeological clearances, and compliance with Section 106 of the National Historic Preservation Act. For major projects involving FERC review, the SHPO must integrate its process with those of the federal agency. **Figure 2.3.1** shows schematically how the integration occurs.

Overview of the Section 106 Cultural Resources Process

The following outlines the basic legal process for historic preservation as it affects the Alaska gas pipeline project area. The key legislation which applies to cultural resources is the National Historic Preservation

Act of 1966, 16 U.S.C. § 470 2006; implementing regulations are found in 36 CFR 800. The major key section is Section 106.

Section 106 states that federal agencies are required to take cultural resources into account any time a federally funded, licensed, or permitted project is undertaken, and to afford the Advisory Council on Historic Preservation (ACHP) (and by delegation, to the SHPO or for certain areas outside of Alaska, Tribal Historic Preservation Officers) an opportunity to comment on the proposed undertaking. In the case of the Alaska gas pipeline, any number of Federal permits or licenses will trigger Section 106 review. It is important to understand that Section 106 applies to a project regardless of land status within the project area (*Federal*, State, or private): if any aspect of a project is affected by a federal undertaking (permit, license, or funding), then the Federal review process *applies* to the entire project area. Once a federal undertaking is identified, the Section 106 process may be initiated.

Step 1. Initiate the Process. This step involves establishment of the undertaking, identification of the lead Federal agency, coordination with other reviews such as NEPA, and identification of: appropriate State (or Tribal) Historic Preservation Officer(s), key Native American Groups, and other consulting parties likely to have an interest in the project. The key part of this initial process is Consultation with SHPO, affected groups, and individuals. The applicant and the lead Federal agency are required to consult with Native American organizations and agencies regarding identification of cultural and sacred sites during planning, and their evaluation and treatment during development. A major emphasis of the latest regulations is that consultation, especially with Native tribes, is to take place throughout the process, and must be documented.

Step 2. Identify historic properties. This is the inventory phase of the process. The proposed project area ("Area of Effect" or APE) is examined for presence or absence of historic properties. The State Historic Preservation Officer (SHPO) is consulted to help define the APE. This may or may not include a field survey; the need for a field survey depends upon the nature of the proposed action and the level of knowledge which already exists about the area. The requirement that a field survey be conducted is determined by the appropriate agency, in consultation with the Alaska SHPO. Experience shows that the earlier a project is defined, and the earlier the identification of historic properties is made, the lower the chances are that there will be a delay in the project. Recent amendments to 36 CFR 800 allow for a phased approach for some of the identification steps, depending on project alternatives, engineering design changes, access to lands, etc.

When archeological or historic sites have been located within a project area, the agency (consulting with the SHPO) applies the National Register Criteria (36 CFR 60), to evaluate eligibility for each property in the project area. If the agency and SHPO agree the properties meet the Criteria, then a property is treated for management purposes as if it were listed in the National Register of Historic Places. Any properties found eligible for the National Register may be listed as individual sites, elements within a multiple property listing, or as an historic district.

In Step 2, there are *two outcomes* of the site assessment process. A finding may be made of "no historic properties affected" or, "historic properties affected".[5] At the *conclusion* of this step, the agency provides documentation to the SHPO, notifying consulting parties. In the FERC version of 106, Step 2 includes an "Overview Report" and a "Plan for Unanticipated Historic Resources and Human Remains."

Step 3. Assess Adverse Effects. This part of the Section 106 process identifies the project's direct and indirect effects, and determines whether or not historically-significant properties will be impacted by the project. If a project will not cause harm to any identified historic properties, or if there are no properties within the project area, then a determination of no historic property adversely affected *is* made, and the project proceeds.

---

5. This two part finding in Step 2 streamlines the pre-1999 regulations, which required an additional "determination of effect" stage.

If the opposite determination of historic properties adversely affected is made, the agency is required to develop a mitigation program for the affected historic properties (sites). Mitigation may involve avoidance, stabilization/preservation, archaeological excavation to recover data, or it may involve other mitigation strategies such as avoidance, or various levels of HABS/HAER documentation.[6] If a determination is made of historic properties adversely affected, the agency must initiate the necessary steps to mitigate any involved properties. (see Step 4 and section on mitigation below). Consultation continues with tribes and other consulting parties at this and each of the other 4 steps.

Step 4. Resolve Adverse Effects. Step 4 of the 106 process requires the agency to consult with the Advisory Council, and by extension, the SHPO to formulate a plan to minimize harmful effects to historic properties. The agency forwards to the SHPO and Advisory Council a description of: the undertaking, the APE, the identification process and findings, record of consultations, and project effects.

In cases where adverse effect is established, it is necessary to formalize the mitigation plan; this is accomplished through the development of an Agreement Document, (in the case of a large project, a Programmatic Agreement or PA) a legally binding document signed by, minimally, the agency, the SHPO, and in some cases, Advisory Council on Historic Preservation. The following may be invited as signatories: parties with responsibilities, and tribes that attach religious /cultural significance to sites on or off of tribal lands.

A PA describes the undertaking, acknowledges that certain historic properties exist within the APE, and spells out what will be done to reduce or avoid impacts to the properties. As in previous steps, consultation must be continued with tribal groups and the public. In the FERC process, this step completes the Overview/Survey Reports and Evaluation Report (see FERC section below).

Overview of the FERC Cultural Resources Process

The FERC cultural resources process basically follows Section 106, however, it has it's own reporting requirements (see Figure 1 flowchart, above). The following review of cultural resource filing requirements is based on a review of 18 CFR 380.12(f). A Minimum FERC Filing (under Resource Report 4 – Cultural Resources), requires "Initial cultural resources consultation and documentation, and documentation of consultation with Native Americans." FERC refers to 380.12 (f) (1) (ii) & (2) - "Overview and Survey reports, as appropriate" and "If surveys are deemed necessary by the consultation with the SHPO/THPOs, the survey report must be filed with the application."

Because the Alaska gas pipeline is a large project, FERC will require an Overview Report of the proposed project area after initial Consultation. This report describes the APE and an inventory of cultural resources potentially affected by the project. Since complete professionally adequate surveys are lacking for portions of the Alaska gas pipeline, and previously undiscovered cultural resources are likely to exist, systematic archaeological surveys (summarized in a Survey Report) will be required. [7]

FERC also requires a Plan for Unanticipated Historic Properties and Human Remains to be developed early in the project and included with the application or incorporated into the Overview or Survey report. This plan incorporates NRHP guidelines in addition to those of NAGPRA. An Evaluation Report (evaluating the significance of sites identified during survey) and a Treatment Plan (a mitigation plan to be implemented after final certification) for the entire project will be required as part of the Full Filing after surveys are conducted and the project proceeds to construction.

Early and effective Consultation prior to writing an Overview Report will engage agencies and potentially interested parties, and solicit an agreement (possibly in a formal Programmatic Agreement) on ways to address both archaeological site concerns, as well as culturally sensitive issues such as sacred sites.

---

6. Historic American Building Survey / Historic American Engineering Record

7. If we assume that archaeological surveys will be required, the term "Minimum" becomes somewhat misleading since roughly 75% of the "Full Filing" cultural resource effort is required for a "Minimum Filing."

Consultation regarding sharing traditional knowledge should be considered. Overlap between archaeological and traditional land use sites exists, and field surveys will likely involve overlapping data sets. The cultural resource data necessary to write the Overview Report usually are site-specific and, therefore, confidential, requiring special labeling according to §380.12 (f)(4).

Archaeological surveys will need to focus on specific proposed locations of the pipeline right of way (exact width to be determined), and ancillary facilities such as gas conditioning plants, compressor stations, access roads and material sites. A Survey Report will describe the results of archaeological field inventory of the APE, as well as the level of effort necessary to conduct the inventory. The report will define survey areas and methods, including categorical exclusions for certain low-probability areas agreed upon and documented during Consultation.

The revised 36 CFR 800 regulations and the Native American Graves Protection and Repatriation Act (NAGPRA) have increased Native American involvement in the FERC process. This is an important consideration with implications for project scheduling. It is important to plan for Consultation as a process involving initial consultation with agencies, the SHPO, and others (prior to drafting Overview and Survey Reports), and continued interaction during the survey and throughout the Evaluation and Treatment Report phases. Depending upon definition of the centerline and APE, and the number of entities involved in consultation, it is conceivable that this process could be very time consuming.

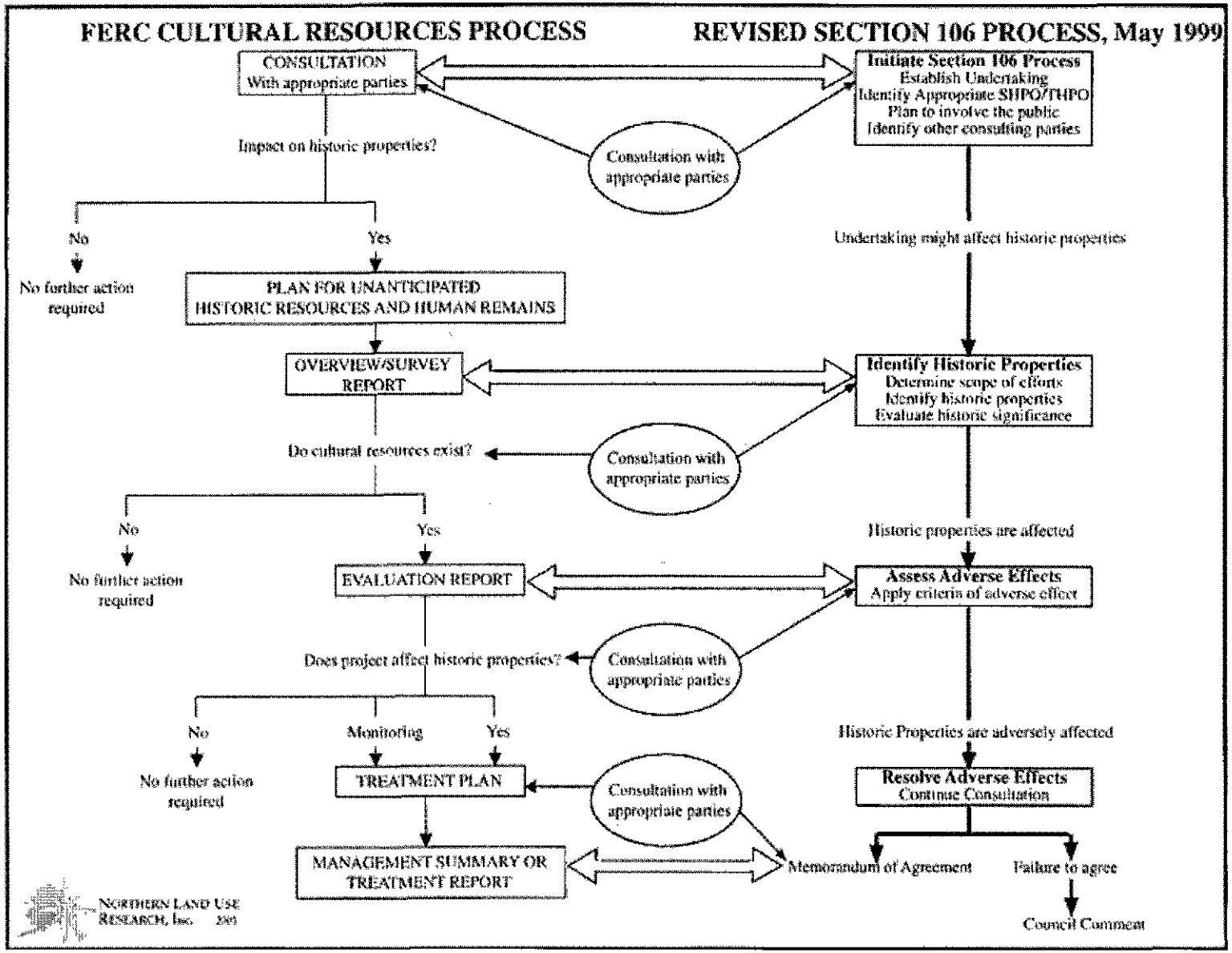
A signed Programmatic Agreement (PA) goes a long way towards satisfying the requirements of §380.14 (a)(4). A Programmatic Agreement is useful to document initial consultation, formalize specific agreements (such as exclusion areas) reached during initial consultation, and to specify project-specific requirements and procedures (such as the Plan for Unanticipated Historic Properties and Human Remains, and possible NAGPRA consultation).

After initial Consultation, finalizing the Overview Report and Plan for Unanticipated Historic Properties and Human Remains, and completing the Survey Report, the applicant will prepare an Evaluation Report to assess the National Register eligibility of individual resources and assess the project's effects on historic properties. If National Register-eligible properties exist, and if they need to be monitored or mitigated during treatment, the applicant, in consultation with the appropriate parties, must develop a Treatment Plan to define mitigation measures.

2.3.2.6 Alaska Department of Fish and Game (ADF&G)

The ADF&G may issue permits for wildlife hazing under 5 AAC 92, in order to provide non-lethal means to remove wildlife from areas where close human/wildlife interactions may prove hazardous.

Figure 2.3.1 Cultural Resource Process Schematic



2.3.3 Local

2.3.3.1 North Slope Borough

The North Slope Borough will require multiple Development Permits for various activities and components of the Project under Title 19 Zoning of the North Slope Borough Code of Ordinances. The North Slope Borough will be a strong advocate for preserving Inupiat subsistence rights.

2.3.3.2 Fairbanks North Star Borough

The Fairbanks North Star Borough may require Zoning Permits, Driveway Permits, Utility/Excavation Permits, and Site Development Permits for various activities and components of the Project under Title 18 Zoning and other applicable sections of the Fairbanks North Star Borough Code.

2.3.3.3 City of Delta Junction

The City of Delta Junction may require permits for various activities and components of the Project under Title IV Land Use of the Municipal Code of Ordinances.

2.3.3.4 City of Valdez

The City of Valdez may require permits for various activities and components of the Project under Title 17 Zoning and other applicable sections of the Valdez Municipal Code.

2.3.4 Native, Tribal or Aboriginal

The federal and state land managers (BLM and ADNR) are required to consider impacts on Alaska Native subsistence rights and to preserve or mitigate impacts to those subsistence rights. The Owner will work closely with all potentially affected Alaska Native subsistence users to identify and protect, so far as is feasible, those subsistence resources. The Stakeholder Issues Management Plan, found elsewhere in this filing, contains more information on this process.

2.3.4.1 Arctic Slope Regional Corporation (ASRC)

The ASRC is a private, for profit Alaska Native owned corporation representing the business interests of the Arctic Slope Inupiat. They are the administrator of approximately 5 million acres of Regional Corporation owned Native Lands on the North Slope. Their primary focus is on economic opportunities for the Inupiat on the North Slope while preserving the Inupiat culture and traditions. They are headquartered in Barrow, Alaska. ASRC has about 9,000 Inupiat shareholders.
Various other Native organizations, such as the Inupiat Community of the Arctic Slope (ICAS), will be strong advocates for Inupiat subsistence rights and preservation of the Inupiat way of life.

2.3.4.2 Doyon Limited

Doyon Limited is a private, for profit Alaska Native owned corporation representing the business interests of Alaska Natives living in interior Alaska. They are the administrator of over 12.5 million acres of Regional Corporation owned Native Lands in a broad region of interior Alaska. Doyon is the largest private land owner in Alaska and is based in Fairbanks, Alaska. Their primary focus is to promote economic and social well-being of their members, to strengthen the Native way of life, and to protect and enhance their land and resources. Doyon has over 14,000 Native shareholders.

2.3.4.3 Ahtna Inc.

Ahtna Incorporated is a private, for profit Alaska Native owned corporation representing the business interests of Alaska Natives living in the Copper River region of Alaska. They are the administrator of over 1.7 million acres of Regional Corporation owned Native Lands in the upper Copper River valley area of south central Alaska. The Owner anticipates that they will require a pipeline right-of-way across Ahtna lands. Ahtna's primary focus is on growth and diversification as well as management of its land, mineral

and human resources. Ahtna is headquartered in Glennallen, Alaska and has approximately 1,200 Native shareholders.

2.4 Required Permits and Approvals

Table 2-2 List of Required Permits and Approvals for US Facilities

Agency	Permits, Authorizations, and Certifications	Project Components
FEDERAL		
Federal Energy Regulatory Commission (FERC)	Certificate of Convenience and Public Necessity, Place of Export Approval, Lead Agency on EIS	Pipeline and LNG
Department of Energy (DOE)	Export License	LNG
US Army Corps of Engineers (USACE)	Section 10 and Section 404 Permits, Cooperating Agency on EIS	Pipeline and LNG
Bureau of Land Management (BLM)	Pipeline Right-of-Way, Temporary Land Use Permits, Material Sales, Cooperating Agency on EIS	Pipeline
Environmental Protection Agency (EPA)	NPDES and Storm Water Permits (Alaska has applied for primacy and may assume this permitting authority if approved by EPA), Cooperating Agency on EIS, SPCC Plan Approval	Pipeline and LNG
US Fish & Wildlife Service (USFWS)	Section 7 Consultation under Endangered Species Act, Cooperating Agency on EIS	Pipeline and LNG
NOAA Fisheries Service	Section 7 consultation under Endangered Species Act, Essential Fish Habitat, Cooperating Agency on EIS	Pipeline and LNG
US Coast Guard	Section 9 Bridge Permits, Waterway Suitability Assessment, Cooperating Agency on EIS	Pipeline and LNG
STATE		
Alaska Department of Natural Resources (ADNR)	Pipeline Right-of-Way, Land Leases, Land Use Permits, Material Sales, Temporary Water Use Permits, Water Appropriations, Alaska Coastal Management Program Consistency, Title 41 Fish Habitat Permits, SHPO Approvals	Pipeline and LNG
Alaska Department of Environmental Conservation (ADEC)	PSD & Title V Air Permits, Section 401 Water Quality Certifications, Solid Waste Disposal Permits, Oil Discharge Prevention and Contingency Plan, Sanitation and Food Handling Permits, (NPDES and Storm Water Permits if delegated by EPA)	Pipeline and LNG
Alaska Department of Fish & Game (ADF&G)	Wildlife Hazing Permits	Pipeline and LNG
Alaska Department of Public Safety, Division of Fire and Life Safety (Fire Marshal)	Plan Review Approval Certificate	Pipeline and LNG
LOCAL		
North Slope Borough	Title 19 Zoning Development Permits	Part of pipeline system
Fairbanks North Star Borough	Title 18 Zoning Permits	Part of pipeline system
City of Delta Junction	Title IV Land Use Permits	Part of pipeline system
City of Valdez	Title 17 Zoning Permits	Part of pipeline system
ALASKA NATIVE		
Ahtna, Inc.	Right-of-Way	Part of pipeline system

2.4.1 YPC Permits and Approvals

The Project will benefit from the substantial permitting work that was undertaken by YPC. It took 11 years from YPC's initial federal right-of-way application filed in May of 1984 until FERC's approval of the place of export site in 1995. During that period of time, YPC expended in excess of $70 million to obtain the State and Federal Project permits and authorizations described herein. This creates a significant time advantage associated with this Project, which should allow construction to commence significantly ahead of a project without the same level of regulatory approvals and environmental data.

The major approvals and rights of way acquired by YPC that will be used and updated by the Port Authority are as follows:

1. Presidential Finding: Exports of natural gas from Alaska to nations other than Canada or Mexico require a Presidential finding under the Alaska Natural Gas Transportation Act of 1976, 15 U.S.C. § 719 et seq. (ANGTA). The finding was promulgated in January 1988. The period of time it took to secure this finding was 3 years and 8 months. The document is attached to the Application as Appendix G-2.

2. State of Alaska Coastal Zone Consistency Determination (Tier 1): The original Trans Alaska Gas System (TAGS) project obtained in 1988 a favorable determination that the general project scope was consistent with the standards of the ACMP. The period of time it took to obtain this permit was 10 months. The document is attached to the Application as Appendix G-3.

3. Bureau of Land Management/U.S. Army Corps of Engineers TAGS FEIS: BLM and USACE prepared a FEIS for the TAGS pipeline project in 1988. The Port Authority plans to update this FEIS. The period of time it took to obtain this permit was 4 years and 5 months. The document is attached to the Application as Appendix G-4.

4. Ahtna Corporation Right-of-Way Agreement: In 1988, the developer of the TAGS project entered into a right-of-way agreement with the Ahtna tribe that sets forth broad terms for the use of right-of-way across Ahtna tribal lands. The document is attached to the Application as Appendix G-5. (Confidential).

5. BLM Right-of-Way Agreement: This right-of-way agreement was also entered into in 1988. The Port Authority intends to update this agreement. The period of time it took to obtain this permit was 4 years and 5 months. The document is attached to the Application as Appendix G-6.

6. State of Alaska Conditional Right-of-Way Lease: As with the BLM right-of-way agreement, the Port Authority intends to update this agreement. The period of time it took to obtain this permit was 2 years and 9 months. The document is attached to the Application as Appendix G-7.

7. Department of Energy Export Authorization: In 1989, the U.S. Department of Energy issued an order authorizing the export of gas to Japan, South Korea, and Taiwan. The Port Authority intends for gas exportation from its project to be to these same three countries. The period of time it took to obtain this authorization was 2 years and 11 months. The document is attached to the Application as Appendix G-8.

8. FERC Authorization of Anderson Bay LNG Facility: In 1995, FERC authorized the construction and operation of a LNG facility at Anderson Bay. The Port Authority intends to update environmental data for FERC. The period of time it took to obtain this authorization was 7 years and 3 months. The document is attached to the Application as Appendix G-11.

9. Air Quality Construction Permit: ADEC issued in 1997 a permit that allows for air pollutant discharges during construction and operation of the LNG facility. The Port Authority intends to supplement the permit with current and additional data. The period of time it took to obtain this permit was 8 years. The document is attached to the Application as Appendix G-12.

As indicated, although many of the YPC permits are valid and currently applicable to the Project in their current form (e.g., the export permit), many will need to be updated to account for the passage of time and any changes in regulatory frameworks. Consequently upon License award the Port Authority will *immediately begin working with the applicable agencies to identify necessary updates and all time and* cost savings from YPC's prior work. To be conservative, the Project timeline developed by the Port Authority, and much of the below discussion, assumes no benefit from existing YPC approvals and permits.

2.4.2 Pipeline

2.4.2.1 FERC (Certificate)

The design concept for the Project's pipeline is to follow the pipeline alignment for the previously authorized YPC project.

This Application assumes that the Project will be authorized by the FERC in a single process that will include the pipeline (NGA Section 7)) and the LNG Facilities (NGA Section 3).

The FERC recently provided at a permitting workshop in Alaska a timeline that it views to be reasonable for authorizing an Alaska natural gas pipeline project using the Pre-Filing Process (Cupina 2007). The Project Owner expects that the mandatory Pre-Filing Process will be required. The FERC timeline represents statutory time limits, where applicable, and should be sufficient to cover the authorization of the Pipeline and LNG Plant, regardless of whether both facilities are combined as one Project filing or are on separate tracks.

The FERC timeline anticipates that it will take 38 months from the Project's Pre-Filing request until issuance of FERC's Final Order. It is assumed that this timeline also is meant to include coordination with other federal and state agencies and completion of their permitting processes (Cupina 2007). The JPO has confirmed that the timeline FERC presented at the workshop reflects allowances for JPO review. The schedule for the Project presented in Section 4.0 of this Regulatory Plan was developed around the FERC's timeline, with additional timeline allowance at the front-end for the Project to prepare the Pre-Filing request and for FERC to authorize construction after the Order.

Although the timeline for the Pre-Filing and Environmental Review processes for Alaska gasline projects has been expanded by the FERC to a much longer duration than is typical for most projects, it is assumed that the sequence of events for the processes will remain unchanged.

Important milestones in the Pre-Filing Process are as follows:

Initiate design work and data gathering for the Pre-Filing request—includes:

- establishing a schedule,
- developing a project description;
- confirming the availability of the LNG site; explaining the Pre-Filing rationale;
- identifying, listing, and communicating/coordinating with the state and federal permitting agencies (determine which federal and state agencies will be confirmed as formal Cooperating Agencies for the Project);
- identifying the value and applicability of obtained YPC senior permits, including any necessary updates;
- identification of other stakeholders;

- holding open houses at strategic and convenient locations to explain the Project to the public;
- development of a Public Participation Plan;
- selection of at least three potential third-party contractors (helps the FERC with the Resource Reports and writing the EIS); and
- transmittal of a Letter of Intent and Preliminary Waterway Suitability Assessment to the U.S. Coast Guard.

Informal initial consultation (meeting) with FERC

Discussion of the nature of the project, the content of the Pre-Filing request, the status and applicability of YPC permits, and the status of progress toward obtaining information required for the Pre-Filing request.

Submit Pre-Filing request

Includes the following information listed in FERC's Pre-Filing rule at 18 CFR 157.21:

- A description of the schedule desired for the project;
- For LNG Facilities, affirmation of the zoning and availability of the proposed site and marine facility location;
- A detailed description of the project;
- A list of the relevant federal and state agencies (with contact names and phone numbers) in the project area with permitting requirements, which for the LNG Plant includes the agency designated by the governor to consult with the Commission regarding state and local safety considerations;
- A statement showing communication/coordination with the federal and state agencies, their willingness to cooperate in the Pre-Filing and NEPA processes, and schedules for permitting relative to the Project plan;
- A list and description of other stakeholders (including contact names and telephone numbers);
- A description of what work has already been done on the Project, including work by YPC, and identification of the environmental and engineering firms and sub-contractors under contract to develop the project;
- Proposals for at least three prospective third-party contractors to assist in preparation of the NEPA document;
- Acknowledgement that a complete Environmental Report and complete application are required at the time of filing (except to the extent it is determined prior YPC work will suffice);
- A Public Participation Plan;
- For the LNG Plant, certification that a Letter of Intent and a Preliminary WSA have been submitted to the U. S. Coast Guard.

FERC approves the Pre-Filing Process

Initiates several activities, as specified in 18 CFR 157.21. The major milestones are as follows:

- *File initial drafts of Resource Reports 1, Project Description, and 10, Alternatives*

  The FERC's rule requires submittal within 30 days after Pre-Filing is formally approved, but given their stretched schedule for the Alaska gasline project, as well as the limitations set by seasonal extremes on acquiring critical information, it is estimated that as much as six months may be required to prepare Resource Report 1 from the time of the start of the Pre-Filing Process. (See schedule in Section 4.0). Regarding Resource Report 10, the FERC is asking for only a summary of alternatives to be considered at this point. Given the time

available in their expanded schedule, it is anticipated that a more complete draft Resource Report 10 can be submitted;

- Scoping

  FERC uses the initial draft of Resource Report 1 to define the Project for scoping and holds scoping meetings within a short period (e.g., 1 week) starting approximately 1 month after the initial draft is filed. Scoping meetings will be held at several strategic locations near the Project, so that it is relatively convenient for the public to participate. Informal open houses to disseminate information and answer questions usually are held along with the more formal scoping meetings. The Owner assumes that even with the expanded schedule for Pre-Filing proposed by the FERC, this part of the schedule will remain unchanged.

  The scoping meetings start and are followed by the scoping period, which normally lasts 30 to 45 days. The Owner believes that 45 days will be a sufficient scoping period for the Project.

- File Draft Resource Reports 1-12

  Resource Reports 1-12 are as follows:

  - Resource Report 1—Project Description
  - Resource Report 2—Water Use and Quality
  - Resource Report 3—Fish, Vegetation, and Wildlife
  - Resource Report 4—Cultural Resources
  - Resource Report 5—Socioeconomics
  - Resource Report 6—Geological Resources
  - Resource Report 7—Soils
  - Resource Report 8—Land Use, Recreation, and Aesthetics
  - Resource Report 9—Air and Noise Quality
  - Resource Report 10—Alternatives
  - Resource Report 11—Reliability and Safety
  - Resource Report 12—PCBs

- In the FERC's Pre-Filing rule, draft Resource Reports 1-12 (the Environmental Report) are required within 60 days after the end of the scoping period. The FERC's expanded timeline for Alaska gasline projects provides for the Environmental Report to be filed approximately 10 months after the Pre-Filing request. The Project's master permitting schedule incorporates this duration, which also extends the period up to the filing of the Environmental Report by over 3 months.

  These durations seem appropriately adjusted for the large scope of the Project, the limitations the RFA process places on the Project start date, and the limitations set by seasonal extremes on acquiring information needed to complete key Resource Reports (e.g., Resource Report 1, Project Description (primarily, elements related to civil survey); Resource Report 2, Water Use and Quality; Resource Report 3, Fish, Wildlife, and Vegetation; Resource Report 4, Cultural Resources; and Resource Report 8, Land Use, Recreation, and Aesthetics).

- The Project's schedule assumes that only one draft of the Environmental Report will be required to be filed with the FERC before a final draft is filed with the FERC application. The Owner's plan to be aggressive in generating the information required to complete the Environmental Report with these two drafts.

- File Draft Resource Report 13 (Engineering and Design Material)

The Pre-Filing rule requires this Resource Report to be filed at least 90 days prior to the filing of the formal FERC application. It is expected that the FERC's expanded schedule will allow this Resource Report to be filed well within this limit.

- File a Follow-On Waterway Suitability Assessment (WSA) with the U.S. Coast Guard

  The WSA for the LNG Plant is required to be filed with the U.S. Coast Guard no later than the FERC application is filed. The expanded schedule proposed by the FERC for the Pre-Filing process will provide ample time for a complete WSA to be prepared.

The Pre-Filing Process ends with the filing of the FERC application, at which time the formal NEPA review process starts, and communication with the FERC becomes more formal (ex parte). The FERC, with the help of a third-party contractor, takes the information it helped the applicant develop for the Resource Reports and uses it to produce the EIS. It is anticipated that one EIS will be developed for the entire Project.

The steps in the EIS development process will be as follows:

- Prepare and Issue the Draft EIS

  The DEIS will be developed by the FERC and its third-party contractor from information derived from the YPC project, various Resource Reports, as well as additional information to be provided by the Project after the FERC filing (information is provided as responses to data requests), by the Cooperating Agencies, and probably by other stakeholders. Several iterations of the DEIS will be produced, starting with a Preliminary Administrative DEIS for internal FERC review, an Administrative DEIS for cooperating agency review, and then the DEIS for public review. This process normally takes about four months after the FERC application, but the FERC's expanded timeline allows 12 months for it to occur.

- Public Comment Period

  The FERC's normal process allows the NEPA minimum of 45 days for public comment after the DEIS is published and the Notice of Availability (NOA) is issued. After enough time has elapsed to allow the public to review the DEIS (approximately one month to six weeks from the NOA), the FERC will hold public comment meetings in strategic and convenient locations to gather public comments to address in the Final EIS. Public comments will not be limited to these meetings. The public will be able to comment by mail and email, as well, during the comment period. For the Project, it is likely that the public comment period will run longer than 45 days, either by formal extension or by the FERC merely continuing to accept comments after the comment period officially ends. The FERC's expanded schedule is sufficient to allow a longer comment period.

- Prepare and Issue the FEIS

  The FERC and its third-party contractor prepare the FEIS by modifying the DEIS to address public comments received during the public comment period, including those received at the public comment meetings. Most likely, public comments, including comments from regulatory agencies, will highlight issues still needing resolution through more data gathering, studies, and/or analyses by the Project. Because of the Pre-Filing Process, however, no major issues should remain to be resolved at this point in the Project. The FERC's expanded schedule shows the FEIS being issued six months after the DEIS is issued.

The FERC can be expected to issue the Order (Certificate) approximately two months after the FEIS is issued. After the Applicant accepts the Order and submits its Implementation Plan to the FERC, the FERC is expected to issue its initial authorization to begin construction within a few weeks, subject to the satisfaction of conditions set forth in the Order. It is possible that the initial authorization may only apply to early stages of activity (such as site preparation) or be facility specific, with other authorizations to follow later.

The ROD will be issued concurrent with the Order (Certificate). The ROD regarding Project approval is prepared in accordance with the Council on Environmental Quality regulations for implementing the

NEPA procedures (40 CFR Part 1500 – 1508) and is integrated into FERC's Order (Certificate). The ROD explains the reasons for the project decision, summarizes any mitigation measures that will be incorporated in the project, and documents any other approvals.

2.4.2.2 BLM (right-of-way on federal land, engineering design review, material sales on federal land, EIS cooperating agency)

The Owner will update the YPC right-of-way with the Bureau of Land Management (BLM) through the BLM Authorized Officer who is located in the JPO. The BLM update process will include BLM acting as a cooperating agency in the EIS being prepared by FERC.

Due to the Congressional coordination requirement for pipelines greater than 24" in diameter, typically the BLM will not issue a Record of Decision and Grant of Right-of-Way until approximately 90 days after the FEIS is published (or about one month after the FERC Order). After the Grant of Right-of-Way and other related permits and approvals, the BLM requires the Owner to apply for Notices to Proceed (NTP). These NTPs are generally broken down into construction segments or construction elements or a combination of the two. The NTPs are issued once the Owner has submitted an NTP package, which the BLM reviews and approves (with or without additional conditions). In general, the engineering design review that BLM undertakes prior to the Grant of Right-of-Way is a review of the Project's engineering design basis. During the NTP process, the BLM also performs an engineering design review of the final pipeline design and construction plan(s).

The Owners are confident the federal right-of-way secured by YPC will suffice for the Project. However, in the highly unlikely event that an entirely new right-of-way over federal lands will be required, the Project timeline in this Application does so allow.

2.4.2.3 USACE (Section 404 and Section 10 permits) and USCG (Section 9 permits)

Much of Alaska is covered with wetlands that are adjacent to the abundant streams, lakes, and navigable waterways of the state and that may be considered waters of the United States. The Owner will file applications with the USACE for Section 404 permits for the placement of fill and discharge of dredged material into jurisdictional waters of the U.S. Section 404 permits will be necessary to construct the pipeline, access roads, stream crossings, gravel pads for compressor stations, and other related facilities. The USACE has an extensive list of Nationwide permits which will be evaluated to see if any of them are applicable to portions of the project. In general, projects of the scale proposed in this application will exceed the applicable threshold limits of the USACE Nationwide permits in Alaska and therefore require the issuance of individual permits.

In addition, permits under Section 10 of the Rivers and Harbors Act of 1899 may be required for fill placed or other work in navigable waters. Bridges crossing navigable waters are permitted by the U.S. Coast Guard under Section 9 of the Rivers and Harbors Act of 1899. However, some portions of that work may be subject to USACE permits under Section 404 or Section 10, or both.

The USACE regulatory process involves extensive public review with additional feedback from State and Federal agencies. In the case of the Project, the USACE is expected to become a cooperating agency in the FERC EIS process and will adjust their permitting process to coincide with the FERC schedule.

2.4.2.4 USEPA (NPDES Permits)

The Project's pipeline and compressor stations will likely need NPDES permits from EPA for the discharge of wastewater from onsite construction camps and hydrostatic test water during the construction phase of the project. Once construction is complete, the compressor stations will likely need NPDES permits for the discharge of treated wastewater. A Storm Water permit (Individual or General Storm Water Permit) will likely be needed for the compressor stations.

The State of Alaska has made application to assume primacy of the NPDES program for Alaska. If the EPA approves that request, then the NPDES and Storm Water programs will be administered by the ADEC. During operations of the facilities the Owner will be required to prepare and implement Spill SPCC plans. SPCC Plans ensure that facilities put in place containment and other countermeasures that

would prevent oil spills that could reach navigable waters. A spill contingency plan is also required as part of the SPCC Plan if a facility is unable to provide secondary containment (e.g., berms surrounding the oil storage tank). Spill contingency plans are administered by the ADEC.

The NPDES permits required for construction and start-up related activities will be processed concurrently with the schedule developed by FERC. Additional NPDES authorizations will likely be needed during the operations phase of the project and will be applied for at the appropriate later date.

2.4.2.5 USFWS (ESA approval)

During the EIS phase of the Project, FERC, as the lead Federal agency will initiate consultation under the Endangered Species Act with the USFWS for any listed species under their regulatory jurisdiction which may be affected by the project. The USFWS will issue a Biological Opinion and incidental take statement, which will guide all Federal agencies in the appropriate mitigation measures to be implemented. In addition, under the Marine Mammals Protection Act (MMPA), the Owner will seek a Letter of Authorization (LOA) for incidental harassment of polar bears that may be encountered in the northern portions of the pipeline construction area in the vicinity of Prudhoe Bay.

2.4.2.6 NOAA Fisheries (ESA approval, EFH approval)

The pipeline and compressor stations will be located onshore between the Prudhoe Bay oil field and the Anderson Bay LNG Facilities site and will not affect any listed species from the Endangered Species Act under the regulatory jurisdiction of NOAA Fisheries (NMFS), nor will it affect any EFH. Therefore, no consultations will be required with the NMFS for this portion of the project.

2.4.2.7 ADNR (right-of-way on state land, land use permits, material sales on state land, fish habitat permit, ACMP, water use permits, engineering design review)

The Owner will confirm the validity of the YPC pipeline right-of-way with the ADNR through the SPCO which is located in the JPO. The Project's pipeline alignment on state lands will overlay the non-exclusive pipeline alignment which was previously authorized, but unconstructed, for the TAGS project. The ADNR will process the right-of-way application under AS 38.35. The Project may also purchase sand, gravel, soil, and rock from State Lands for construction and maintenance. The SPCO will follow a coordinated engineering review process with the BLM in reviewing and approving the engineering design of the project.

In addition, the ADNR will issue and/or update YPC permits for land use, water use, and fish habitat permits for activities associated with the construction and operations of the pipeline, compressor stations, and related facilities. Those portions of the pipeline project which are in the Alaska Coastal Zone will be subject to a Coastal Project Consistency Review as part of the regulatory permitting process. These regulatory approvals/updates will be undertaken in coordination with the schedule established by FERC for this project.

2.4.2.8 SHPO (NHPA approval)

The Owner will undertake a cultural resource study of the proposed pipeline and related facilities. The resulting report will be submitted to the appropriate State and Federal agencies, who in turn will seek concurrence and approval from the State Historic Preservation Officer (SHPO) under Section 106 of the National Historic Places Act. If cultural resources are to be impacted by the project, appropriate mitigation measures will be developed in consultation with the SHPO.

2.4.2.9 North Slope Borough, Fairbanks North Star Borough, City of Delta Junction, City of Valdez (local zoning permits)

Local zoning permits will be required for all elements of the pipeline project which fall within the administrative jurisdiction of the North Slope Borough, Fairbanks North Star Borough, City of Delta Junction, and City of Valdez.

2.4.2.10 ADEC (PSD and Title V air permits, oil spill contingency plan – ODPCP, solid waste disposal permits, water quality certification)

It is anticipated that the Project's Pipeline compressor stations may be PSD Major Sources of air emissions pollutants under the federal Clean Air Act and 18 AAC 50. PSD Permit applications will be filed with ADEC to construct each of the pipeline compressor stations. Once the compressor stations are constructed, applications will be made to ADEC for Title V Operating Permits. The PSD permit applications will be processed by ADEC in coordination with the schedule established by FERC. The Title V permit applications will be processed at a later date, post construction of the pipeline compressor stations.

As part of the USACE Section 404 permit process, the ADEC is required to review the project for consistency with approved State Water Quality Standards and issue a 401 Certification before the USACE may issue its Section 404 permits.

The Owner must also apply to the ADEC for solid waste disposal permits under 18 AAC 60, before onshore disposal of solid waste generated during the construction of the pipeline and compressor stations. ADEC permits are also required for camp incinerators and water/wastewater systems.

The Owner will prepare an oil spill contingency plan and submit it to the ADEC for approval. The spill plan, known as an Oil Discharge Prevention and Contingency Plan (ODPCP) will address fuel storage tanks and fuel transfers at the pipeline construction camps needed during construction and subsequent operations of the pipeline compressor stations.

2.4.3 LNG Plant

2.4.3.1 FERC (Authorization)

The LNG Facilities will be FERC jurisdictional under Section 3 of the NGA. Since the Pipeline and the LNG Facilities will be covered by one updated EIS, the sequence of events and schedule for the Pre-Filing Process and NEPA review for the LNG Facilities will be as described for the Pipeline. If the Pipeline is FERC regulated as assumed in this Application, the Owner will seek a Declaratory Order from FERC excluding the LNG Facilities from the tariff.

2.4.3.2 USACE (Section 10 and 404 permit)

The LNG Facilities at Anderson Bay will be at the same site as that permitted for YPC. The USACE was co-lead in the preparation of the Pipeline EIS for YPC in 1988. The USACE was a cooperating agency on the subsequent EIS prepared by FERC for the LNG Facilities in 1995. The Owner has proposed a different LNG liquefaction process in this Application than that proposed by YPC although that is subject to change depending on the preference of the ultimate Project partners.

The Owner anticipates that their land clearing requirement will be the same as the 425 acres of spruce-hemlock forest, wetlands, and non-wetland sub-tidal marine habitats identified in the TAGS EIS. The site, due to its steep topography, will require extensive excavation and filling to level the site and create bedrock benches upon which the LNG facilities will be constructed. This will result in the need to dispose of over 3 million cubic yards of surplus overburden and rock. By using estimates that were prepared in the past, land preparation of the LNG Facilities site will also likely result in the loss of over 35 acres of estuarine and palustrine wetlands and over 13 acres of non-wetland sub-tidal marine habitats. These site preparation construction activities and the resulting facilities and marine jetties or docking facilities will require authorizations from the USACE in the form of Section 404 permits under the Clean Water Act, for the placement of dredged or fill material into waters of the U.S. and adjacent wetlands. In addition permits under Section 10 of the Rivers and Harbors Act of 1899 will be required for all work and structures placed in the navigable waters of Anderson Bay and Port Valdez.

The USACE regulatory process involves extensive public review with additional feedback from state and federal agencies. This Application contemplates the USACE will become a cooperating agency in the FERC EIS process and will adjust their permitting process to coincide with the FERC schedule. The

USACE Section 10 and 404 permits will be required prior to start of construction at the Anderson Bay LNG Facilities site.

2.4.3.3 USEPA (NPDES permits)

The Project's LNG Facilities will likely need NPDES permits from EPA for the discharge of wastewater from onsite construction camps and hydrostatic test water during the construction phase of the facility. Once construction is complete, the facility will likely need NPDES permits for the discharge of treated wastewater. A Storm Water permit (may apply under a General Storm Water Permit) will likely be needed for the facility.

The State of Alaska has made application to assume primacy of the NPDES program for Alaska. If the EPA approves that request, then the NPDES and Storm Water programs will be administered by ADEC.

The NPDES permits required for construction and start-up related activities will be processed concurrently with the schedule developed by FERC. Additional NPDES authorizations will likely be needed during the operations phase of the project and will be applied for at the appropriate later date. During operations of the facilities the Owner will be required to prepare and implement SPCC plans. SPCC Plans ensure that facilities put in place containment and other countermeasures that would prevent oil spills that could reach navigable waters. A spill contingency plan is also required as part of the SPCC Plan if a facility is unable to provide secondary containment (e.g., berms surrounding the oil storage tank). Spill contingency plans are administered by the ADEC.

2.4.3.4 USFWS (ESA approval)

During the EIS phase of the Project, FERC, as the lead Federal agency will initiate consultation under the Endangered Species Act with the USFWS for any listed species under their regulatory jurisdiction which may be affected by the project. The USFWS will issue a Biological Opinion and incidental take statement, which will guide all Federal agencies in the appropriate mitigation measures to implement. If required, the Owner will seek a LOA under the MMPA for incidental harassment of sea otters in the vicinity of the LNG Facilities.

2.4.3.5 NOAA Fisheries (ESA approval, EFH approval)

During the EIS phase of the Project, FERC, as the lead Federal agency will initiate consultation under the Endangered Species Act with NOAA Fisheries (NMFS) for any listed species under their regulatory jurisdiction which may be affected by the project. The NMFS will issue a Biological Opinion and incidental take statement, which will guide all Federal agencies in the appropriate mitigation measures to implement. If required, the Owner will seek either a LOA or an Incidental Harassment Authorization (IHA) for non-endangered marine mammals that may be affected by project activities.

In addition, the NMFS will consult on impacts to EFH that may be affected by the LNG Facilities portion of the project and recommend any appropriate mitigation measures to protect EFH.

2.4.3.6 ADEC (PSD and Title V air permits, oil spill contingency plan – ODPCP, solid waste disposal permits, water quality certification)

It is anticipated that the Project's LNG Facilities will be a PSD Major Source of air emissions under the federal Clean Air Act and 18 AAC 50. In 1997 after 8 years ADEC issued a permit that allows for air pollutant discharges during construction and operation of the LNG facility. The Port Authority intends to supplement the permit with current and additional data and a PSD Permit update/application (depending on the applicability of the YPC permit) will be filed with ADEC to construct the LNG facility. Once the facility is constructed and operational a Title V Operating Permit from ADEC is necessary. The PSD permit update/application will be processed by ADEC in coordination with the schedule established by FERC. The Title V permit update/application will be processed at a later date, post construction of the facility.

As part of the USACE Section 404 permit process, the ADEC is required to review the project for consistency with approved State Water Quality Standards and issue a 401 Certification before the USACE may issue the 404 permits.

The Project must apply to the ADEC for solid waste disposal permits under 18 AAC 60, before onshore disposal of solid waste generated during the construction of the LNG Facilities site.

The Owner will prepare an oil spill contingency plan and submit it to the ADEC for approval. The spill plan, know as an Oil Discharge Prevention and Contingency Plan (ODPCP) will address fuel storage tanks and fuel transfers at the LNG Facilities needed during construction and subsequent operations of the LNG Facilities.

2.4.3.7 SHPO (NHPA approval)

The Owner will undertake a cultural resource study of the proposed LNG plant site and terminal. The resulting report will be submitted to the appropriate State and Federal agencies, who in turn will seek concurrence and approval from the State Historic Preservation Officer (SHPO) under Section 106 of the National Historic Places Act. If cultural resources are to be impacted by the project, appropriate mitigation measures will be developed in consultation with the SHPO.

2.4.3.8 USCG (WSA approval and ROD)

The USCG's role and authorities with respect to review of operations of the LNG Facilities were previously discussed in Subsection 2.3.1.7.

2.4.3.9 ADNR (land lease, fish habitat permit, ACMP)

The site of the propose LNG plant and terminal is on State of Alaska lands. Use of the site will be subject to the Project's obtaining a land lease for the site from the ADNR. In addition it is anticipated that construction of the LNG plant will require a number of land use permits, temporary water use permits, and the purchase of gravel and rock from State lands for fill material to construct the LNG Facilities site. As the proposed Project location is within the Alaska Coastal Zone, in 1988 the YPC project obtained a favorable determination that the general project scope was consistent with the standards of the ACMP. Either that determination will be updated or a Coastal Project Consistency Review will be undertaken prior to the issuance of new permits. The YPC ACMP update and/or consistency review process, along with the processing of permit applications, leases, and material sales, will be done concurrently and in coordination with the schedule established by FERC for the EIS. After the LNG plant is in operation the Project will apply for a water appropriation based upon a demonstration of continuing need from available water sources.

2.5 NEPA Process and Lead Agency

The Application assumes FERC will be the lead agency for issuing federal authorizations for the Project and for compliance with NEPA. It is likely, however, that the FERC will share some responsibilities of the lead with the BLM and the USACE, given the scope of the Project and the extent of the Project footprint that will be under their jurisdictions. It is also assumed the Federal coordinator established by the Alaska Natural Gas Pipeline Act will provide a framework for efficient interaction among these and other agencies with jurisdictions over the Project.

2.6 Permitting Interdependencies

2.6.1 NEPA Agencies

2.6.1.1 FERC

The FERC recently promulgated Order 687 (2006) as part of its responsibilities to implement the Energy Policy Act of 2005. Order 687 is a final rule to amend 18 CFR Parts 153, 157, 375, and 385 to coordinate the processing of authorizations required under federal law for proposed natural gas projects subject to NGA Sections 3 and 7. The Order specifies that the FERC will establish a schedule for the completion of reviews of requests for authorizations (permits, certificates, opinions, approvals, concurrences, etc.) necessary for a proposed project and compile a consolidated permitting record for a project. Within the context of this rule, the FERC will require documentation from the Project at the time of filing the FERC application that all other permit applications have been submitted to the appropriate agencies, or documentation of reasons why certain applications have not been submitted. According to the rule, the FERC's completion of the environmental review of the application will depend on favorable determinations from other agencies on the Project's authorization requests. Also, clearance to commence construction generally will not be granted by the FERC until the Project has received authorizations from all of the other jurisdictional agencies.

2.6.1.2 BLM

The Owner believes the existing federal right-of-way authorized by the YPC project will be employed for the Pipeline. However, although unlikely, if a new federal right-of-way were necessary the BLM would only be able to issue the new federal rights-of-way and associated permits and approvals after the FEIS has been released to the public; the BLM had released to Congress a notice of intention to grant the right-of-way, together with the agency's detailed findings as to the terms and conditions it proposes to impose; and a Record of Decision had been prepared. It is estimated that the Record of Decision and new Grant of Right-of-Way (and associated permits) would be issued approximately 90 days after the FEIS had been released to the public or about 30 days after the FERC Order had been issued for the Project.

2.6.1.3 USACE

Assuming no value from existing YPC permits, the USACE will only be able to issue Section 404 and Section 10 permits after the FEIS is released to the public and a Record of Decision has been prepared after a 60-day waiting period. Furthermore, the USACE can only issue Section 404 permits after the ADEC has issued a Section 401 water quality certification (the ADEC should issue the 401 certification between 30 to 60 days after the FEIS is released to the public). In addition the ADNR must issue a Coastal Consistency Determination for those portions of the project that are within the Alaska Coastal Zone. The Coastal Consistency Determination will normally recommend stipulations or conditions of approval necessary to render the project consistent with the ACMP standards. If the Owner accepts the Coastal Consistency Determination, these stipulations will become enforceable on the permits. The Coastal Consistency Determination should be issued coincidentally with the 401 certification. After these State certifications are issued, then the USACE permits should be issued at approximately the same time as the FERC Order.

2.6.1.4 USEPA

The EPA has a unique dual role in the process as both a permitting agency that will issue NPDES permits for the project, but also as a NEPA oversight agency which must review the FERC EIS documents and rule on their sufficiency. In the first role it will not issue the NPDES permits until after the FEIS has been released to the public and a Record of Decision has been prepared. In the latter role it conducts the sufficiency review concurrent with the EIS process.

2.6.1.5 USFWS

The USFWS is required to issue a Biological Opinion at the end of the consultation process prior to the preparation of the FEIS. Any mitigation measures identified in the Biological Opinion will become a part of the FEIS.

2.6.1.6 NOAA Fisheries

The NOAA Fisheries (NMFS) is required to issue a Biological Opinion at the end of the consultation process prior to the preparation of the FEIS. Any mitigation measures identified in the Biological Opinion will become a part of the FEIS. NMFS will also determine whether any mitigation measures as necessary to protect EFH and those measures will also be incorporated into the FEIS.

2.6.1.7 ADNR

The ADNR is required to issue a Coastal Project Consistency Determination for all activities and project components that occur within the Alaska Coastal Zone. The Consistency Determination will be issued 30 to 60 days after the FEIS has been released to the public if the YPC determination cannot be updated.

2.6.2 Certifications

2.6.2.1 401 Water Quality

The ADEC is required to issue a Section 401 water quality certification prior to the issuance of the Section 404 permit, and such a certification typically is issued between 30 to 60 days after the FEIS is released to the public. The 401 certification is required before the USACE can issue a Section 404 permit.

2.6.2.2 Alaska Fire Marshal plan approvals

The Alaska Department of Public Safety, Division of Fire and Life Safety (Alaska Fire Marshal) must issue a certification of plan review approval before construction of the facilities may begin. This process is independent of the EIS process or other regulatory permitting for the project.

3.0 Permit Streamlining

Due to their commitment to monetizing Alaska North Slope gas at the earliest opportunity and delivering the benefits of gas sales to the State of Alaska with minimal delay, the Project Owner is keenly interested in opportunities to fast track and streamline the Project's permitting timelines.

Several opportunities for streamlining are viewed to be available and are discussed below. These are reflected in the permitting approach chosen for the Project and will be aggressively pursued in the Project Development and Execution phases.

3.1 FERC Pre-filing Process

One of the key opportunities available for streamlining the FERC NEPA review process is the Pre-Filing Process, which enables applicants to incorporate stakeholder consultation in their early planning activities and stage submittals of environmental information documents in a way that best ensures the ultimate completeness and acceptability of the applicant's Environmental Report (ER) and the ensuing EIS built upon the ER. The Owners intend to take full advantage of the process in the early stages of the Project and may accelerate certain tasks by optimizing the resources dedicated to their completion. These tasks include, but are not *limited* to, the following:

- Determining early with applicable agencies which YPC *senior* permits are valid as is, which need to be updated and the appropriate process for updating, and which permits need to *be* redeveloped from scratch.
- Performing preliminary engineering and design work earlier in order to move up the schedule for the Pre-Filing Request;
- Applying the resources required to perform key field work in the initial field season following the State's decision on AGIA submissions;
- Applying the resources necessary to shorten the typical time from ER draft to filing by 50 percent.

The Owner is prepared to work closely with the FERC and its selected third-party EIS contractor to reach agreement on key scopes of work for field studies and on the format and content of Resource Reports and the Applicant's Environmental Report. The Owner is committed to working closely and in complete cooperation with the FERC and other federal and state agencies throughout the duration of the licensing process.

3.2 Use of Nationwide Permits

The USACE has issued general and nationwide permits that "pre-authorize" certain activities within waters of the US and adjacent wetlands. The Owner will evaluate these nationwide permits to see if any of them are applicable to portions of the project. In general, projects of the scale proposed in this application will exceed the applicable threshold limits of the USACE nationwide permits in Alaska and therefore require the issuance of individual permits.

3.3 Joint Pipeline Office

The BLM Authorized Officer and staff are the lead Federal agency in the JPO, which was established in 1990 as an assemblage of Federal and State agencies focused on administering oil and gas pipelines in Alaska. Other resident Federal agencies in the JPO include: US DOT, Office of Pipeline Safety; and Environmental Protection Agency. Non-resident Federal agencies that coordinate closely with the JPO include: US Army Corps of Engineers, US Coast Guard, and the Minerals Management Service.

Resident State agencies are lead by the Alaska Department of Natural Resources State Pipeline Coordinator's Office and include: Alaska Department of Environmental Conservation; Alaska Department of Labor and Workplace Development; Alaska Department of Public Safety;and Division of Fire

Prevention. Non-resident State agencies that coordinate closely with the JPO include: Alaska Department of Fish and Game and Alaska Department of Transportation and Public Facilities.

The JPO is headquartered in Anchorage, but also maintains field offices in Fairbanks and Valdez. The JPO provides a closely coordinated Federal and State administration and oversight of oil and gas pipeline systems in Alaska from permitting through construction, operations, maintenance, and rehabilitation. The agencies of the JPO are expected to coordinate closely with FERC in the processing of permits to coincide with the schedule that FERC establishes for the EIS and the rest of the regulatory process.

The JPO provides a streamlined and integrated process for the oversight and monitoring of existing pipeline systems in Alaska and for the expedited review and approval of new pipeline projects and for field monitoring of construction of those projects

Through its co-housed, integrated federal/state organization, the delegated authorities held by its member agency representatives, and its first-hand familiarity with pipeline construction and operational issues in Alaska, the JPO provides a unique asset and vehicle for aligning and expediting agency decisions on technical design issues.

4.0 Permitting Schedule

In keeping with their commitment to move ANS gas to market as quickly as possible, the Project Owner has set forth an aggressive, but achievable project development and regulatory schedule. The schedule recognizes the FERC as the lead federal agency and places significant emphasis on the close working relationship that the FERC is creating with the JPO and, in particular, the federal and state land management agencies in Alaska.

The Owner has made the following assumptions regarding the permitting schedule that is proposed:

- All state and federal agencies will adhere to the permit processing and NEPA timelines that FERC has or will develop for the Project;
- The Federal Coordinator will not impose any new processes, procedures, or timelines that will impair the schedule, outside of those already mandated within the scope of existing federal regulations utilized by FERC and the other federal agencies with regulatory jurisdiction on the Project;
- The State of Alaska will issue a timely AGIA license on or about May 1, 2008;
- Little to no time savings occur from existing YPC permits;
- That there will not be any litigation, injunctions, or other judicial relief that impairs the permitting schedule or the subsequent start of construction for the Project; and
- That there will not be any congressional or Alaska legislative actions which will impair the permitting schedule or the subsequent start of construction for the Project.

4.1 Initial Submittals

The initial environmental and regulatory approval process involves submitting applications for certifications, permits, approvals, and rights-of-way that sanction the project and approve the construction of the various components of the project. Many of these authorizations from federal and state agencies also allow for the continued operation and maintenance of the project once it is constructed. Examples of these types of authorizations include the FERC Final Order, federal and state Rights-of-Way, USACE Section 10 and 404 permits, and ADEC PSD permits. These authorizations and approvals typically have a long lead time to secure the approval to construct and operate a project.

In addition, there will be numerous permits required from federal and state agencies for activities involving the construction of the Project which may be short term or one time events. These permits generally are in the form of temporary land use or water use permits or permits to construct in or cross a fish bearing stream. These permits allow activities during a specified window of time or for a specific construction related event. These permits are needed for construction, but typically have a short processing time to secure approval.

All of the permits and approvals needed to sanction and construct the project will be processed during this initial submittal phase of the project and will be done in accordance with the schedule established by FERC. Additionally, there are permits that are required which authorize the discharge or release of regulated pollutants such as wastewater discharges, solid waste disposal, etc. There are a number of these that will also be required during the construction phase of the project, in order to regulate the release or disposal of construction related waste materials, etc.

4.2 Subsequent Submittals

Once constructed, the GCP, Pipeline and compressor stations, and the LNG Facilities, will have the need to have ongoing releases or discharges of regulated pollutants which will require additional authorizations or permits. Some of these approvals or permits are linked to permits secured during the initial submittal phase of the regulatory process.

These will be permitted in the initial submittals phase, but once these facilities are constructed and operational, they will need Title V Operating Permits from ADEC for the ongoing operations of these facilities. The Title V permits will be submitted and processed as subsequent submittals after construction of the facilities. Likewise, it is anticipated that there will be additional permits for wastewater discharge and other similar permits for ongoing operations for the life of the project, which will be sought in subsequent submittals after project construction has been completed and the facilities commissioned for operations.

4.3 Specific Permitting Sequence

As the assumed lead Federal agency for the Project, the FERC's review and approved process will define the Project's overall permitting schedule. The Project will take full advantage of the FERC's pre-filing process and will comply fully with the milestones the FERC has established for Alaska gasline reviews.

The master permitting schedule for the Project was developed around this timeline, although it also allows for additional months that will be needed for the Owner to prepare for the Pre-Filing request and for FERC to authorize construction after issuance of the Order.

The schedule relies on the Project's ability to take full advantage of the summer 2008 field survey season, defined as the period from May 1 to September 30. The summer season is critical to routing decisions, mode determinations, facility site selection, and acquisition of data needed for development of FERC resource reports.

In parallel with initiating field survey activities, the Project will begin design work and data gathering for the FERC Pre-Filing request including developing a project description, confirming the availability of the LNG site, setting forth the Pre-Filing rationale, and identifying, listing, and communicating/coordinating with the state and federal permitting agencies. These activities are scheduled for July and August 2008. Selection of potential third-party contractors (for the EIS), and development of a Letter of Intent and Preliminary Waterway Suitability Assessment for submittal to the U.S. Coast Guard will also be undertaken during this time frame.

It is expected that an informal initial consultation (meeting) will be held with the FERC to discuss the nature of the project, the content of the Pre-Filing request, and the status of progress toward obtaining information required for the Pre-Filing request. This meeting will occur in early July 2008, and the Pre-Filing request will be submitted later in the month.

It is expected that the FERC will approve the Pre-Filing Process in early August 2008, which in turn triggers the 30-day timeline for submittal of Resource Reports 1, Project Description, and 10, Alternatives. At this stage of the submittal sequence, the Project Owner anticipates that Resource Report 10 will be only a summary of alternatives to be considered.

Between early September and the end of November 2008, it is expected that FERC will hold scoping meetings using the initial draft of Resource Report 1. The scoping meetings will be held at strategic locations near the Project, and are followed by the scoping period, which normally lasts 30 to 45 days. The permitting schedule allows 45 days for the scoping period for the Alaska Project, but can accommodate an additional 45-day extension.

Over the ensuing 10 months, the Project will develop and submit Draft Resource Reports 2-12, which include:

- Resource Report 2—Water Use and Quality
- Resource Report 3—Fish, Vegetation, and Wildlife
- Resource Report 4—Cultural Resources
- Resource Report 5—Socioeconomics
- Resource Report 6—Geological Resources
- Resource Report 7—Soils
- Resource Report 8—Land Use, Recreation, and Aesthetics
- Resource Report 9—Air and Noise Quality
- Resource Report 10—Alternatives
- Resource Report 11—Reliability and Safety
- Resource Report 12—PCBs

The reports rely heavily on fieldwork done in the field season (Summer 2009). The Resource Reports become the basis for the Applicant's Environmental Report, which the Owner intends to submit by end of September 2009. The Project's permitting schedule assumes that only one draft of the Environmental Report will be required to be filed with the FERC before a final draft is filed with the FERC application in late November 2009. The Owner plans to be aggressive in generating the information required to complete the Environmental Report with these two drafts. The Project's Waterway Suitability Assessment (WSA) will also be filed with the U.S. Coast Guard in this timeframe.

The Pre-Filing Process ends with the filing of the FERC application, at which time the formal NEPA review process starts. The schedule allows a calendar year for development of the Draft EIS, and an additional six months for issuance of the FEIS. These time durations reflect the FERC's expanded schedule presented at the Anchorage meetings in September 2007.

In preparing the FEIS, the Owner assumes that the FERC and its third-party contractor will modify the DEIS to address public comments received during the public comment period and will highlight issues still needing resolution through more data gathering, studies, and/or analyses by the Project.

As noted on the schedules, the FERC can be expected to issue the Order (Certificate) approximately two months after the FEIS is issued. After the Owner accepts the Order and submits the Implementation Plan to the FERC, the FERC is expected to issue the authorization to begin construction within two months.

4.4 Key Milestones

Key milestones in the regulatory process in the Project's Regulatory Schedule include the following:

- Submit Pre-Filing Request to FERC – 5/8/09
- Submit State and Federal Rights-of-Way Applications – 5/8/09
- File Draft Resource Report 1 (Project Description) and Stakeholder List to FERC – 9/7/09
- FERC Conducts Scoping Meetings – 9/22-28/09
- File Draft Resource Report 13 (LNG Facility Engineering and Design) to FERC – 5/11/10
- File FERC Application – 11/5/10
- FERC Issues DEIS – 11/9/11

- FERC Issues FEIS – 5/11/12
- FERC Issues ROD and Final Order – 7/12/12
- FERC Issues Authorization to Construct – 8/10/12
- Major State and Federal Permits Issued – 7/13/12
- State and Federal Rights-of-Way Reissued if Necessary – 8/29/12
- State and Federal NTPs Issued – 9/27/12
- Construction Begins – 9/27/12

4.5 Overall Timeline

The overall project timeline, including pre-AGIA License award work (preparation for summer 2008 field season), spans approximately 45 months. The FERC process from initiation of the Pre-Filing Request until the FERC Final Order, consumes about 38 months of this timeline. This timeline assumes no benefit from existing senior YPC permits and regulatory authorizations.

4.6 Critical Path and Potential Sources of Delay

The critical path for the permitting process is centered on the front-end activities (early work), the initial field season, and NEPA EIS schedule for the project, which FERC estimates will take 18 months from draft to final EIS.

The first season's field results are critical to the ability to file a complete and substantiated Project Description by fall 2008. The summer 2008 work is equally critical to the development of final work plans and data acquisition for the 2009 field program, as both feed into the 2009 Resource Report timeline.

There are several potential sources of delay during the EIS process, starting with the initial scoping meetings and comment period before drafting the EIS and continuing with public meetings and the ensuing comment period when the DEIS is released to the public. Both sets of meetings and formal comment periods have the potential for new and unanticipated issues to be brought up which could require additional study or data collection that could create delays in the schedule. In addition, if FERC fails to adequately address issues raised in the public comment process with the release of the FEIS, there could be challenges raised by stakeholders or other interested parties, that could delay the issuance of the FERC Final Order or one or more of the major State or Federal Permits that may be linked to the EIS. Care will be taken in the early stages of the Pre-Filing process to ensure that all potential stakeholders are identified and that their issues are surfaced and addressed in scoping of the NEPA document.

5.0 Management of the Permitting Process

As noted in the introduction to this Regulatory Plan, the regulatory approval process to be followed for permitting the Project will encompass multiple governmental agencies at the federal, state, and local Borough levels, each with specific objectives, perspectives, and requirements to be met in administrating their respective public interests and resource protection duties during design, construction, and operations of the gas delivery system.

Permitting of large diameter pipelines in Alaska has a long history dating back to authorization and construction of the TAPS Pipeline in the mid-1970s, permitting of the ANGTS in the early 1980s, and approvals gained for the YPC Pipeline System and LNG export terminal in the late 1980s and mid-1990s. The permitting processes for each of these successive developments, and construction experience from TAPS and later large diameter pipeline systems in the Lower 48, have created a vast and mature set of experiences and understanding of key issues attendant to pipeline permitting and construction in Alaska and methods used for coordinating and integrating multi-jurisdictional governmental reviews.

In fusing collaboration between federal and state agencies in Alaska, the JPO has played an efficient and effective role in reviewing applications and overseeing operations for major pipeline operators in the state over the past 17 years, and has developed an integrated review and management process.

In parallel with the existing JPO regulatory review processes, the FERC has evolved its own time-proven methodology for integrating multiple agency reviews in other parts of the US, the Pre-filing Process. With the active involvement of resource agencies in Alaska, including the JPO, the FERC has adapted this process to the specific situation and needs of permitting another major gas pipeline system in Alaska. To take maximum advantage of the collective knowledge of the resource and land management agencies in Alaska, the Owner plans to work proactively with these agencies and the FERC in implementing the integrated review process. The Owner believes the process will be effective in surfacing issues for early attention in planning and design and the Project will bring a commitment to move the process forward efficiently and successfully.

The Owner intends to achieve early and ongoing engagement with the participating agencies and bring openness and flexibility to the permitting discussions. The Owner sees this commitment to full engagement with the agencies as a hallmark of the Project's permitting strategy. One of the successful mechanisms used to define and progress design and permitting concepts during the developmental phases of the YPC and ANGTA predecessor projects was creation of agency/applicant working groups that surfaced key issues and worked together to resolve them and reflect these approaches and understandings in project plans and specifications. The Owner plans to adopt this interactive practice and hold ongoing meetings with key agency staff to jointly define key issues and develop appropriate mitigation strategies at the conceptual stage of design and carry these through to final design and construction planning. Measures that the Owner is especially interested in implementing as a result of prior projects in Alaska include joint briefings and strategy development session, discipline and resource-specific working groups, and collaborative development of mitigation plans.

Use of the FERC's pre-filing process will facilitate early identification and resolution of issues of concern to the regulatory agencies in Alaska and the general public in the potentially affected communities in the Pipeline corridor.

The Owner is committed to effective engagement with public and third party stakeholders beginning with scheduling of public briefings and workshops for communities in the corridor during the summer of 2008. Effective consultation with stakeholders is an important precept of the Project's permitting approach as reflected in the Application's Stakeholders Issue Management Plan.

		commissioners' evaluation of the readiness and ability of the applicant to complete the project presented in the application;		
	43.90.130(20)	Demonstrate the readiness, financial resources, and technical ability to perform the activities specified in the application by describing the applicant's history of compliance with safety, health, and environmental requirements, the ability to follow a detailed work plan and timeline and the ability to operate within an associated budget.	All of Section 2 and 2.9	2.9
		Required documents;		
		Signed application with corporate approvals	1.10.4 1.13.3	See application
		Signed certification, Appendix E	1.13.3	See application
		List of Applicant's Required and Additional Commitments		N/A
		Electronic Copy of Entire Application (On CD in PDF Print Ready Format)	1.5	CDs attached
		List of Data for Applicants to Provide in MS Excel Format, Appendix C (On CD in MS Excel)	2.10.1	Appendix NN
		Identification of Proprietary Information and Trade Secrets and summary of Information for Public	1.13.6	G-5, I, K, L, V, CC, DD, EE, FF, GG, II, JJ, KK, NN, RR

Applicant's Name _____
William M. Walker, Project Manager
Alaska Gasline Port Authority

2.3.1 PROJECT EXECUTION PLAN
TABLE OF CONTENTS

2.3.1.1 EXECUTION OVERVIEW		2
2.3.1.1.a	PROGRAM MANAGEMENT	2
2.3.1.1.b	PROJECT ORGANIZATION	2
2.3.1.1.c	INTERFACE MANAGEMENT	4
2.3.1.1.d	STAKEHOLDER MANAGEMENT	5
2.3.1.2 PROJECT MANAGEMENT		5
2.3.1.2. a	ENVIRONMENTAL HEALTH AND SAFETY (ES&H) MANAGEMENT	5
2.3.1.2.b	QUALITY MANAGEMENT	7
2.3.1.2.c	PROJECT CONTROLS	13
2.3.1.2.c.i	SCHEDULE MANAGEMENT	16
2.3.1.2.c.ii	COST MANAGEMENT	20
2.3.1.2.c.iii	SCOPE AND CHANGE MANAGEMENT	25
2.3.1.2.c.iv	RISK MANAGEMENT	28
2.3.1.2.d	RESOURCE MANAGEMENT	30
2.3.1.2.e	WORKFORCE MANAGEMENT	30
2.3.1.3 ENGINEERING EXECUTION PLAN		30
2.3.1.4 PROCUREMENT AND LOGISTICS EXECUTION		46
2.3.1.4.a	PIPELINE	46
2.3.1.4.a.i	PROCUREMENT	46
2.3.1.4.a.ii	TRAFFIC AND LOGISTICS	48
2.3.1.4.b	LNG PLANT	49
2.3.1.4.b.i	PROCUREMENT	49
2.3.1.4.b.ii	TRAFFIC AND LOGISTICS	49
2.3.1.5 CONSTRUCTION EXECUTION		50
2.3.1.5.a	PIPELINE CONSTRUCTION EXECUTION PLAN	51
2.3.1.5.b	LNG PLANT CONSTRUCTION EXECUTION PLAN	62
2.3.1.6 COMMISSIONING AND START-UP MANAGEMENT		70
APPENDIX A	ENVIRONMENTAL MANAGEMENT PLAN	71

2.3.1.1 EXECUTION OVERVIEW

Ensuring the successful execution of the Alaska Infrastructure project represents a challenge. The scope is large, whether measured in terms of cost, duration, the huge workforce that it will employ, the technical challenges in moving large quantities of gas, the remote locations where construction will be performed over the 806-mile corridor, the scale of procurement of materials and equipment from many different countries, the logistical effort to bring the components together in the right place at the right time, the multiplicity of interfaces within the project organization, and many other factors.

The manner in which the project must perform is key, striving to achieve our zero-accident target and our commitment to minimize environmental and social impact, among other important objectives. Against this background, we aim to deliver a quality facility that performs as designed, on time and in budget, and provides the intended benefits to the Alaskan people.

These factors have been at the forefront of our thoughts as we have developed plans to execute the project, which are described in the following sections.

2.3.1.1.a PROGRAM MANAGEMENT

The capability of upper level management and the strength of the organization are key factors in an undertaking of this size and complexity. Bechtel is one of very few companies in the world that has performed work on a similar scale successfully in the past. Examples of Bechtel's capabilities are provided in greater detail in Section 2.9.

From the organizational standpoint, we propose that the overall direction and coordination of all elements of the project—from license award through to final completion—will be provided by a program management team led by a senior-level Bechtel program director. Individual deputy project directors, responsible for the pipeline and the LNG plant, report to the program director.

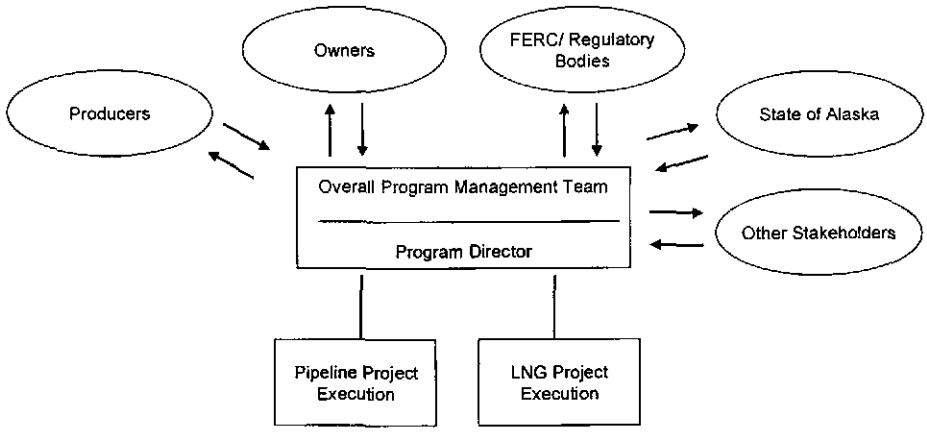
Within Bechtel, a senior executive will provide sponsorship for the project, ensuring that the full range of expertise and resources is made available as required. Further details of this structure are given in the following Section 2.3.1.1.2 Project Organization. Among the benefits of such an organization are: it is focused on monitoring the true status of all elements and exercising the necessary controls to ensure that resources are used effectively and shared according to the real project priorities; to ensure that progress is monitored and corrections are made; and to ensure high-level accountability of the individual project stakeholders for safety, environmental compliance and quality performance.

2.3.1.1.b PROJECT ORGANIZATION

The proposed overall high-level project organization structure is shown in Figure 2.3.1.1.b.1. It illustrates the relationship between the program management team and the individual project management teams responsible for execution of the pipeline and the LNG plant. The key external interfaces are also shown.

Figure 2.3.1.1.b.1

HIGH-LEVEL PROJECT ORGANIZATION STRUCTURE



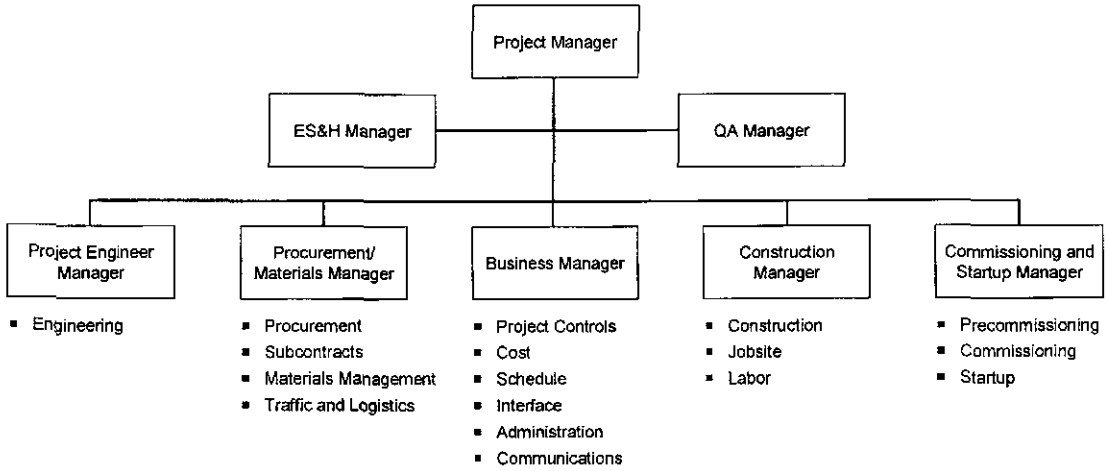
F20071101Z/Org Chart 1.ppt

The overall program management team incorporates the key functions required for maintaining sufficient oversight to be effective.

Each project team incorporates the key functions and resources to perform its work and function effectively in coordination with the other teams. A typical project team structure is shown in Figure No. 2.3.1.1.b.2. Descriptions of the responsibilities and methods of each function are provided later in this section. The key interfaces between the individual project teams and other groups are also shown.

Figure 2.3.1.1.b.2

PROJECT TEAM STRUCTURE
(Reports to Program Director)



F:\2007\1012\Org Chart 2.ppt

2.3.1.1.c INTERFACE MANAGEMENT

Management of the many interfaces with other organizations involved in the project is key to the successful execution of the work. They will include other groups within the overall project organization, regulatory and state bodies, other contractors, subcontractors, vendors, and local organizations; and in each area, the interface has to be managed effectively.

We plan to approach this as follows:

- Develop a detailed interface management plan early following the license award. This plan, which specifies our detailed interface management procedures, will span all phases of the project, identify all significant interfaces, document their nature and status, and identify the required action for their management. It will identify the parties responsible and required resolution timing, and will provide the framework to monitor and track each interface activity, ultimately to its resolution;
- Assign dedicated interface management personnel with appropriate experience in coordination roles; and
- Ensure that all interfaces that influence the success of the project are clearly understood, and that they receive the appropriate priority of management focus and resources.

We plan to assign a dedicated interface manager to each project management team to lead the effort.

Implementation of the interface effort early in the job is paramount. The interface manager will start work on the interface management plan at license award. He will base the plan initially on the basis of the project work breakdown structure (WBS) as to the entities affected by or affecting each major scope area and also refer to the Project Responsibilities Matrix which is also a key element of our project management approach (detailed later in this section). The plan will be updated as the detailed project execution plans and WBS are developed immediately post-award.

2.3.1.1.d STAKEHOLDER MANAGEMENT

Our plans for ensuring that the relationships with stakeholders are managed effectively during project execution are described in Section 2.2.2 – Stakeholders Issue Management Plan

2.3.1.2 PROJECT MANAGEMENT

2.3.1.2.a ENVIRONMENTAL HEALTH AND SAFETY (ES&H) MANAGEMENT

Bechtel embraces ES&H as a corporate business value, and ES&H performance is a key result area used by executive management to evaluate the success of projects and project teams. No project is considered a success unless ES&H is deemed a success as well. Senior management is actively involved and held accountable for the ES&H performance within their respective areas of responsibility. Each management position carries with it defined responsibilities that are identified within the ES&H management system and further detailed in the Project ES&H execution plan. Management activities include:

- Participation in project planning activities with the project leadership team;
- Visible participation in project worksite inspections;
- Contact with members of the project workforce regarding ES&H; and
- Direction to project management that Bechtel will not accept contractors incapable of complying with project ES&H minimum expectations.

Line supervisors become actively engaged in the management of ES&H because:

- Project management is leading by example;
- ES&H activities are defined and linked to supervisors' written position descriptions;
- ES&H is the first agenda item at ALL project meetings; and
- The project incentive program has been designed to reward supervisors who carry out their ES&H responsibilities Project departments prepare plans that include the objective to strengthen supervisors' ES&H performance.

The project-specific ES&H execution plan, which will be developed during the development phase is organized according to the previously described ES&H management system. Elements of this plan include:

- Bechtel ES&H policy;
- Encouraging positive behavior;
- Planning, organizing, and communicating;
- Managing contractors and external relationships;
- Managing hazards and risk;
- Environmental controls;
- Competency and well-being;

- Managing change;
- Emergency response;
- Learning from experience;
- Security measures; and
- Audit and review.

Particularly important to the task of provisioning the project with adequate safety and technical resources are the planning, organization, and communication section of the project ES&H execution plan. This section prompts the project management team to prepare a project ES&H timeline; from that timeline the project ES&H staffing plan is developed. This approach will ensure that an adequate number of ES&H personnel are available to support the execution of the project ES&H plan.

The Environmental Management Plan is provided as appendix A to this Project Execution Plan.

- ES&H activities are defined and linked to supervisors' written position descriptions;
- ES&H is the first agenda item at ALL project meetings; and
- The project incentive program has been designed to reward supervisors who carry out their ES&H responsibilities project departments prepare plans that include the objective to strengthen supervisors' ES&H performance.

The project-specific ES&H execution plan, which will be developed during the development phase is organized according to the previously described ES&H management system. Elements of this plan include:

- Bechtel ES&H policy;
- Encouraging positive behavior;
- Planning, organizing, and communicating;
- Managing contractors and external relationships;
- Managing hazards and risk;
- Environmental controls;
- Competency and well-being;
- Managing change;
- Emergency response;
- Learning from experience;
- Security measures; and
- Audit and review.

2.3.1.2 b QUALITY MANAGEMENT

Quality Execution and Objectives

The objective of the Bechtel Quality Management System is to put in place the necessary controls, to assure that reliable and efficient quality products and services that meet specified requirements are provided and to maximize the delivered value to the Alaska Infrastructure Project.

The quality management system implemented by Bechtel complies with internationally recognized standards and is based on proven industry working practices and processes for the execution of engineering, procurement, and construction projects.

The quality execution strategy for the Alaska Infrastructure Project centers on the unambiguous definition and effective communication of the project quality management system, quality assurance and quality control philosophy and requirements at the beginning of the development phase, and the verification of effective implementation and compliance with those requirements.

The project quality objectives should satisfy project and contract requirements and statutory regulations and requirements with regard to safety, fitness for use, performance, and reliability of the facilities.

In supporting the execution strategy and quality objectives, the project quality management system will comprise the work procedures, instructions, work processes, and activities to be implemented across the project throughout engineering, procurement, and construction to ensure compliance and will be defined in a project quality plan.

Bechtel Quality Management System

The Bechtel Quality Management System has been certified by Det Norske Veritas (DNV), in accordance with DNV accreditations from the ANSI-ASQ National Accreditation Board (ANAB), the United Kingdom Accreditation Service (UKAS), and the Dutch Accreditation Council (RvA), to meet the requirements of the International Organization for Standardization (ISO) Standard 9001:2000 Quality Management Systems – Requirements. The scope of the certification includes project management, engineering, procurement, and worldwide construction and commissioning services.

The Bechtel Quality Management System is defined in the Quality Management System Manual. The manual identifies the requirements for the preparation of documented quality system procedures and *instructions used to implement the system.*

The requirements of the Quality Management System Manual apply to all personnel who manage, perform, and verify work affecting quality, whether employed directly or indirectly by Bechtel. Bechtel has the responsibility of ensuring that organizations performing work on Bechtel's behalf have a quality system that meets the requirements of this manual, applicable to the scope of services being provided. The Quality Management System Manual contains the quality policies and the overall structure of the quality management system and defines Bechtel's commitment to ISO 9001.

The applicability of the quality management system to the Alaska Infrastructure Project will be defined in a project quality plan and implemented by the applicable office and project-specific procedures and work instructions. Specific contractual requirements between Bechtel and the Port Authority and/or its Project development partners (referred to hereafter as the "**Owner**") will be incorporated in the project quality plan.

Project Quality Plan

A project quality plan will be issued for use early in the development phase of the project. The plan will provide an outline of the overall framework of the quality management system, project-specific requirements, project organization, and division of responsibilities for the implementation of the Quality Management System Manual policies. The plan will cover the front-end engineering design, permitting and planning activities to be performed during the development phase, and will be expanded to cover the detailed engineering, material and equipment procurement and construction activities as the project nears the execution phase.

The project quality plan will apply to activities performed by Bechtel in the management and control of products and services provided as program manager in support of the Alaska Infrastructure Project. These activities include engineering, procurement, construction, construction management, pre-commissioning, and commissioning support of facilities as specified in the contract.

The applicable requirements of this plan shall be passed on to Bechtel suppliers, contractors and subcontractors, to the extent required to assure the quality of products and services provided.

Project Quality Management System

The quality management system for the Alaska Infrastructure Project, as shown in 2.3.1.2.b.1, will provide an effective means of ensuring that services and products provided by Bechtel conform to requirements specified by the Owner. The project quality management system will place a heavy emphasis on the prevention of problems rather than a dependence on detection once problems have arisen. Key to this proactive approach will be the orientation of project personnel in the requirements and the implementation of the project quality management system, supplemented by specific and pinpointed training.

The project quality plan, along with associated project and discipline work procedures and instructions, will form the documented quality management system of the project. The project quality management system recognizes the important contributions of all execution locations and associates providing support in the project management, engineering, design, material management, and construction activities.

The project quality management system will draw upon the best practices and standard work processes of all parties to create a fully integrated system of procedures and work instructions for controlling the products and services being provided under the scope of the contract.

Project procedures and instructions will be identified and developed to address the scope of services and activities performed. These procedures and instructions will be identified in a matrix contained in the project quality plan and provide a road map for how the requirements of the project quality management system will be satisfied. All procedures issued to satisfy the project quality management system requirements will be reviewed by quality assurance (QA) for compliance with commitments.

The overall focus of the project quality management system is to ensure that the codes, policies, standards, and procedures are properly adhered to and implemented by all in the execution of the Alaska Infrastructure Project.

The effective implementation of the project quality management system will be verified and reported at all levels throughout the development and execution phases of the project. This will include all execution locations.

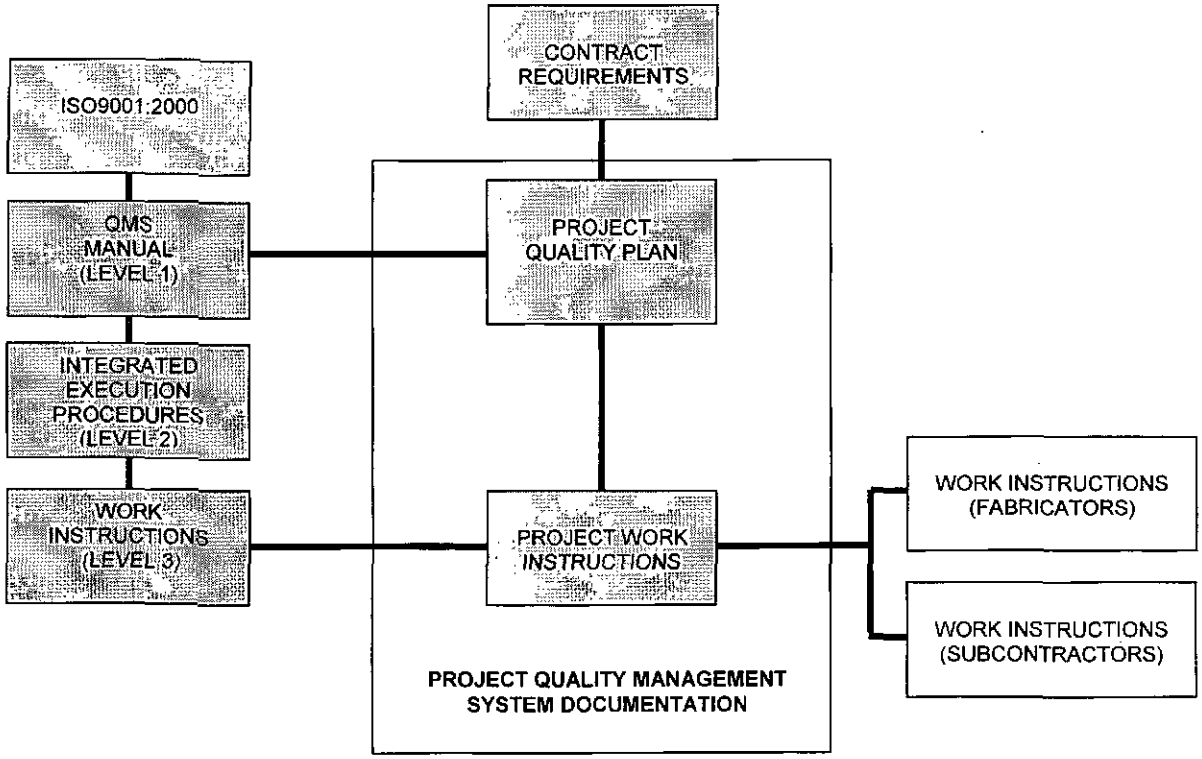


Figure No. 2.3.1.2.b.1 Project Quality Management System

Organization for Quality

The program management organization for quality, associated with the review and verification of quality activities, is a matrix group comprised of QA, engineering, procurement, contracts, and construction. The overall quality organization will be defined in the project quality plan.

QA has the overall responsibility for assuring that all project activities are performed and accomplished in accordance with the project's approved policies, procedures, and instructions. This is accomplished through the performance of reviews, surveillances, and audits of activities, including suppliers, contractors and subcontractors. The QA organization will be under the leadership of the program quality assurance manager (PQAM) who will report to the project director. The PQAM will be responsible for the overall management and oversight of quality functions and activities on the project.

Engineering is responsible for assuring that engineering and design activities performed by Bechtel, suppliers, contractors and subcontractors are in accordance with the project procedures and/or

specifications. This is accomplished through participation in the review, checking, design verification, and/or approval cycles for documents issued for use on the project. Bechtel has overall responsibility for the accuracy and approval of design documents issued.

Procurement is responsible for assuring that purchased items, materials, and services are in full compliance with the project and procurement document requirements. This is accomplished through participation in supplier shop qualifications and attendance at prescribed witness and hold-points and for final inspection and release of materials for shipment.

The field procurement group, in close coordination with Construction Field Engineering, is responsible for assuring that purchased items received at the construction sites have not been damaged during shipment and verifying that items that did not receive a release inspection at supplier shops are in compliance with procurement documents. This is accomplished through a visual inspection for damage, review of applicable documentation, and verification of item or material identification and marking requirements.

Contracts, in close coordination with Engineering, Construction, and QA, will be responsible for assuring that services provided by contractors and subcontractors are in full compliance with the project and contract requirements. This is accomplished through methodic implementation of contract formation and administration requirements and attendance at prescribed weekly progress monitoring meetings.

Construction is responsible for ensuring that all fabrication, installation, and erection of the facilities performed, either by Bechtel, contractors, or subcontractors, is in accordance with the design drawings and specification requirements. This is accomplished by quality control oversight and verification through in-process inspection and attendance of prescribed testing and inspection activities.

QA audits will be conducted to verify the project's effective implementation and compliance to approved policies, procedures, and instructions and to identify opportunities for improvement in the implementation of the project quality management system. The audits will be conducted on activities performed at all execution locations, construction sites, fabrication facilities, and on suppliers, contractors and subcontractors. The audits will be conducted on a schedule commensurate with the activities being performed and early enough to ensure that adequate controls have been planned and implemented. A master audit schedule will be developed to identify the project activities to be included in the audit program and will be maintained throughout the project.

A key ingredient of the project quality management system is that it places a strong emphasis on the prevention of problems and the effective implementation of a proactive quality verification program. To this end, QA audits will be supplemented, as necessary, by the implementation of a quality surveillance program. This proactive portion of the quality verification program will be initiated early in the development phase of the project, with special attention given to processes and activities that are critical to the success of the project. The scheduling of surveillance activities is performed to respond to project conditions, changes in the project scope, changes in the schedule of activities, or to accommodate the importance of specific activities. A surveillance schedule will be developed to identify the project activities to be included in the surveillance program and will be maintained throughout the project.

Non-compliances may be identified as a result of QA audit, QA surveillance, review of other key quality documents and records, or based on formal or informal communications to QA from other personnel. Non-compliances, in addition to the controls established by cognizant organizations, shall be documented in the body of the audit or surveillance report and on a corrective action report (CAR). Initiated CARs will be reviewed with responsible personnel from the organization subject to audit or surveillance, required corrective action and agreed response due dates, and verification of corrective action completion performed by QA. Non-compliances shall be tracked to identify status of completion. A QA open items list (OIL) shall be established, maintained, and periodically reported to the project management team, identifying the status of the items being tracked, person assigned responsibility for action, date each item was identified, and projected completion date of required corrective action. The OIL will also include an analysis of the trends from non-compliances and audit data and identify any additional corrective and/or preventive actions for program management team approval.

Control of Contractors and Subcontractors

All contracts and subcontracts for services will contain requirements for the implementation of a quality management system and the development and issuance of a contract-specific project quality plan defining the overall quality system and controls to be implemented in the execution of the work.

These plans will be reviewed and approved by QA for compliance with contract requirements. QA audits and surveillance of contractors and subcontractors will include verification that procedures and controls are in place and being implemented.

Bechtel control and monitoring of contractor and subcontractor product quality will be accomplished using a two-fold program of quality assurance (monitoring and independent verification of work processes and completed work) and quality control (implementation of established procedures to ensure completed work fully complies with the design requirements, that required inspections and tests have been performed by qualified personnel and recorded in accordance with documented procedures, and that necessary corrective work has been authorized by appropriate personnel and successfully completed).

QA audits will be conducted to verify contractor and subcontractor conformance to approved policies, procedures, and instructions. The audits will be conducted on a schedule commensurate with the activities being performed and early enough to ensure that adequate controls have been planned and implemented. All major subcontractors will be audited once during the duration of the contract. A master audit schedule will be developed to identify the contractor and subcontractor activities to be included in the audit program.

Bechtel will monitor contractor and subcontractor installation for compliance with quality requirements and to ensure that the subcontractors and their craftsmen are fabricating, installing, and erecting plant facilities and equipment in accordance with the design drawings and specifications. Each contractor and subcontractor will be responsible for performing their own inspections and completing the documentation that will be required for turnover as part of the project requirements.

Bechtel will be responsible for oversight and verification of quality performance by Bechtel, contractor and subcontractor personnel. Verification will be accomplished by performing appropriate examinations, tests, measurements, and inspections using applicable procedures, inspection instructions, and acceptance criteria from engineering design documents such as drawings and specifications, construction standards, and contractor and subcontractor requirements.

Bechtel will ensure that documented procedures and controls are in place and implemented by contractors and subcontractors to ensure that inspections and tests to verify product quality are performed by qualified personnel in compliance with documented procedures. Specific requirements will include:

- Receiving inspection and testing;
- In-process inspection and testing; and
- *Final inspection and testing.*

Bechtel will ensure that documented procedures and controls are in place and implemented by contractors and subcontractors to ensure that any product that does not conform to specified requirements is identified to prevent inadvertent use, installation, dispatch, or mixing with conforming products. These controls shall include, as appropriate:

- Provisions for the identification, documentation, evaluation, segregation, and disposition of non-conforming product and notification to the functions concerned;
- Provisions for the disposition to scrap, rework, re-grade for alternative applications, or accept with or without repair by concession (waiver to specified requirements) by the appropriate authorities (i.e., design engineer, certification engineer, certifying authority, third-party inspectors, or Bechtel); and

- Provisions for the re-inspection of repaired or reworked product in accordance with documented procedures.

Bechtel will ensure that documented procedures and controls are in place and implemented by the project contractors and subcontractors that establish the systems to be implemented to detect, evaluate, and correct non-conformances detected during reviews, audits, surveillances, and inspection activities.

The use, or repair and use, of a product that does not conform to specified requirements will be reported for concession to the appropriate Bechtel representative as required by contract or specification requirements. In this case, the nonconforming condition shall brought to the attention of Bechtel immediately and prior to the initiation of any other construction activities that would render the nonconforming item or area inaccessible for inspection.

Control of Suppliers

The Bechtel system for the control of suppliers will rely heavily on a formalized program of source inspections and monitoring, technical reviews of supplier document submittals, and the witness of critical equipment performance test performed by the supplier. These activities are integrated with a formal material and equipment receipt inspection program to verify supplier compliance with purchase order requirements.

Procurement is responsible for assuring that purchased items, materials, and services are in full compliance with project and procurement document requirements. This is accomplished through the following:

- Coordinating bid reviews and supplier selection with QA and engineering;
- Reviewing purchase order packages with engineering and QA to establish the necessary level of supplier surveillance and audit and to identify supplier quality control and inspection and test record requirements;
- Participating in supplier shop qualifications and attendance at prescribed witness and hold-points and final inspection and release of materials for shipment; and
- Developing, issuing, and controlling procurement and material management procedures.

Bechtel will ensure that documented procedures and controls are in place and implemented by suppliers, contractors and subcontractors for the identification and control of equipment and materials from receipt and during all stages of production, delivery, and installation.

Controls shall include requirements for:

- When traceability of equipment and materials is a requirement, specifications and requisitions shall require that:
    - Individual materials (or batches or materials) have a unique identifier;
    - Documentation of this identification be controlled; and
    - These documents form part of the quality records for the project.

Bechtel suppliers will be audited by QA, on a case-by-case basis, as determined necessary by the project, to provide further assurance of the quality of the supplier products and services being provided.

2.3.1.2.c PROJECT CONTROLS

Overview

The integration of estimating, cost control, schedule control, and scope growth management defines project controls, which is a crucial element of the Alaska Infrastructure Project (AIP). The importance of

project controls is critical throughout the project. Planning and execution alignment between Bechtel and FERC requirements during the initial planning will lay solid groundwork for successful project execution.

The project controls program defined for the IAP is guided by the following basic principles:

- Proactive systems with emphasis on future activities, trends and their potential impact on project plans and targets and risk management;
- Planning, executing, and controlling actions focusing on critical issues;
- Accountability for schedule and cost control clearly defined with reporting performed at the appropriate level of detail;
- Detail planning and control of the work by the individual teams responsible for the work; and
- Effective communication and sharing of information among FERC and all subcontractors.

Our team will establish and maintain engineering, procurement, and construction controls. Data integration is achieved by the use of a common work breakdown structure (WBS), code of accounts (COA), and, as applicable, organizational breakdown structure (OBS)—all consistent with the project's standard numbering system. All cost and schedule data are collected, consolidated, and reported through the project controls project management team (PMT) using these WBS, COA, and OBS codes and structures.

The main objectives of our project controls team are to:

- Implement cost and schedule tools, systems, controls, and reports in accordance with approved project controls procedures;
- Establish cost and schedule baselines against which cost and schedule performance will be monitored and reported;
- Collect, evaluate, validate, consolidate, and report cost and schedule status for each respective WBS element;
- Trend, forecast and manage risk;
- Monitor cost and schedule performance to facilitate the early identification of cost and schedule baseline exceptions;
- Support corrective action planning to mitigate cost and schedule impacts; and
- Provide proactive support to the entire project team and make a positive impact on successful project outcome.

The cost and schedule controls philosophy places special emphasis on early and proper budget establishment, followed by timely tracking of the work, using appropriate tools to monitor the results, measure deviations, and report status. This emphasis is focused during preparation of the baseline estimate, translating into a realistic, but aggressive budget and schedule that is monitored and controlled through the EPC phase of work. This priority for control is placed on the use of simple, effective, and proven systems, derived from standard, approved, proven procedures. The tools employ a combination of manual and computerized techniques. The systems accommodate the import and export of common flat files of data in order to accommodate electronic transfer of data. They are designed to be project-oriented, generating information at a level of detail that is cost-effective and practical in terms of its end use. Our project controls team will ensure the project is set up so that the tools and reporting not only satisfy the needs of the project, but also those of the Owner.

During the estimate phase (FEED), the project controls team is instrumental in organizing and advancing a plan to effectively achieve the required deliverables and quality estimates. As the project continues

through EPC, the detail and specific controls increase as the project and the scope and deliverables are defined.

During this phase, project controls immediately establishes a consistent and logical work breakdown structure (WBS) for all facets of the project. The WBS is the basis of the standard reports as well as client-specific reporting. With the construction of the various phases of the work, efficiency in the project can be realized in the following areas:

- Planning, executing, and supporting the FEED and EPC phases of the project;
- Developing and implementing the multi-scope integrated EPC schedule;
- Setting up and implementing the engineering progress and performance monitoring system;
- Setting up and implementing the home office project hour and cost-monitoring system;
- Setting up and implementing the cost and commitment monitoring and forecasting system;
- Converting the estimate details into the budget control system;
- Establishing an effective change-management and risk-management program; and
- Establishing the overall program reporting structure.

Our project controls team is managed as one program. The project controls approach and philosophy follow and coincide with the overall project execution plan. Our team follows common procedures and guidelines established in the overall project execution plan. Continued communication and collaboration with all parties ensure transparency within the system coordination. Office-by-office, engineering, procurement, and construction data is integrated through the use of the overall WBS.

The WBS divides the overall project into the appropriate units which are further divided into engineering, procurement, and construction. Project Controls systematically translates this information from the FEED estimate continuing through the EPC phase. The WBS appropriately drills down to discipline, according to the split of work. The tools and information roll up to an agreed summary level. The PMT reports, summary, and detail are agreed by the project team and the Owner during the initial meetings of the project kick-off. Early definition of the plot plan and execution strategy is key to WBS definition. The team coordinates the WBS in detail with Owner's management in order to satisfy management and site needs.

The project controls philosophy is based on early and thorough planning, followed by timely execution of the work utilizing appropriate tools of each phase of the project to monitor the results, measure progress, and make recommendations to mitigate risk while achieving both cost and schedule. The philosophy of project controls is guided by these basic principles:

- Closed-loop planning, execution, and control action focusing on critical issues;
- Forward-looking controls with emphasis on future events, trends, and their potential impact on project schedules and cost as defined in the scope;
- Detailed planning, control, and commitment by the individuals or organization responsible for the work;
- Accountability for schedule and cost performance with work identified to the most effective level of detail; and
- Effective communication and sharing of information among the project team.

The controls used are simple, effective, and flexible. During the execution of the work, the controls instituted are continually reviewed for effectiveness.

Project Controls exists for the primary purpose of coordination and management of the budgeting and scheduling of the project, identifying deviations from budgets and schedules and recommending corrective actions when deviations occur.

The Project Controls team administers the functions of cost control, scheduling and schedule control, financial, contract and subcontract formation, risk management and project cost estimating under a project controls manager (PCM).

The PCM is a member of the project management team (PMT) and is responsible for all aspects of cost control, trending/change management, scheduling, cost and schedule forecasting, progress reporting, and cash flow. He manages this through the project controls teams responsible for the details of the various units and OSBL scope.

The project PCM has a PMT organization consisting of cost engineering, planning/scheduling, and estimating plus cost engineers and planner/schedulers, as necessary, to produce overall project reporting and control. The core organization will be responsible for providing resources to the individual execution teams; providing systems and procedural guidelines for execution of the work; and for providing overall project reporting, forecasting, and analysis. The primary specific unit controls functions are provided by personnel assigned to individual plant process units or areas. These teams receive day-to-day execution direction from their respective project managers and are responsible for reporting, forecasting, and analyzing their respective process units.

Overall responsibility for the project controls program resides with the PCM of project controls in the PMT. He is functionally responsible for consistent application of project controls procedures and work instructions for all units/project teams.

2.3.1.2.c.i SCHEDULE MANAGEMENT

WBS Code of Accounts Integration

Starting with initial award of the contract, the Project Controls begins working with the Owner to establish the WBS for the set-up of our systems and schedule development. The preliminary basis of design package and the estimate effort are organized and controlled at a discipline and department level. During the FEED phase, the project team evaluates the proposed WBS structure and incorporates any adjustments necessary to establish the code of accounts.

The FEED and EPC detail cost codes are based on the mutual agreement and set up to facilitate the use of the internal cost and data collection systems. The cost code serves as the basis for the preparation and summarization of estimates, budgets, accumulating costs, and commitments in a consistent and meaningful manner, providing a vehicle for analyzing actual/ forecast cost versus budget, as well as providing uniform data for use in future on project estimates and project-to-project comparisons.

Planning/Scheduling

During the FEED phase of the project, the schedule activities are planned, progressed and monitored. The project master schedule is officially updated and submitted/reported on a monthly basis. These two tasks provide early warning for management to take corrective action to ensure targeted completion dates are maintained.

FEED Schedule

The objective of planning and scheduling during the FEED is to provide the information necessary for the project team to successfully develop and monitor the FEED effort, identify problem areas early, initiate corrective action, and capitalize on opportunities to ensure project completion on schedule. The schedule that is developed supports this objective and assists in developing the final baseline schedule. The FEED schedule is formally updated and progressed and issued monthly for the duration of the FEED phase. Progress is based on the weighted status of deliverables.

The standard approach includes a FEED deliverables matrix. This matrix lists the deliverables and level of completeness for each item. The deliverables matrix forms the basis for defining and controlling the schedule, which controls and directs the overall FEED process.

Our project controls team will use the Primavera scheduling software to assist the project team in developing a valid and integrated schedule. Activity logic integration of all scope will be accomplished through the WBS. The elements of the FEED schedule control program are as follows:

- WBS;
- FEED schedule;
- Critical path determination and analysis;
- Resource loading;
- Progress curves; and
- Trend program to control changes to the FEED and EPC schedules.

Also during this phase, as scope identification progresses, the summary FEED and EPC schedule continue to grow into more detail. This means that, as the specific detail scope is better identified, additional activities are added to the schedule that are expanding into the detailed engineering and procurement (EP) schedule. Shortly after award, a 60-day look-ahead schedule is developed to ensure the project begins in a direction that ensures supporting the critical activities and decision milestones identified in the submitted schedule.

The detailed EPC schedule will be developed in Primavera using the project's established WBS. The project team reviews the detailed schedule for logic, durations, and comparison to historical information. The PMT must approve the detailed EPC schedule to establish the schedule baseline.

EPC schedule control documentation includes the following:

- WBS;
- EPC intermediate schedule;
- Critical path determination and analysis;
- Detail schedules;
- Resource loading;
- Progress curves; and
- Trend program to control changes to the EPC schedules.

Home-office schedules are updated monthly, while construction schedules are updated every week. Once a month, all progress, performance metrics, and project costs are summarized and compared against the plan. Critical action items are identified, monitored, and discussed in the home office project review meeting or the field construction project review meeting. A monthly progress report is prepared and submitted by the PMT to Bechtel senior management and Owner's project management.

The overall project milestone schedule, intermediate schedules, detail schedules, and the project execution plan are developed during the FEED phase of the project. An intermediate execution schedule is developed for each unit. The schedule development process goes hand-in-hand with the process design and site adaptation activities. These engineering activities feed the scheduling process and the estimate preparation. Our project controls team will incorporate detailed activities and planning based upon current project knowledge and experience.

The detailed EP schedule is developed using the WBS as agreed by the PMT. Later, as the project progresses through the FEED and into the EPC phase, a sub-project is created for the construction

schedule and identifies field need dates by construction work area to act as the basis of evaluating float for the engineering deliverables. The detailed schedule is approved by the project team and establishes the schedule baseline. The milestone schedule is established at that time to reflect the detailed EP schedule and/or the latest developed construction plan.

We will work with Owner and FERC representatives during the development of the schedules. We require input from the all staff to ensure the schedule developed meets the project completion milestones.

Our team coordinates the project plans with Owner, FERC and local agencies to the maximum extent possible to ensure adequate workforces are available to support project work activities, plans and schedules. Several levels of schedules will be submitted with the project execution plan for final review and approval by Owner.

Pre-Planning Interactive Schedule Sessions

The pre-planning, interactive schedule sessions are to take place during the FEED phase, affording in-depth planning and dialogue to best understand the integration of the full scope of work. This includes assessment of long-lead items, interfaces between plants and associated scope of work, consideration of craft staffing levels, and specific decision points required. Our project controls team continues to use interactive planning sessions of this nature at key times during each phase of work for each process unit to refine and develop detailed schedules that are incorporated into the Primavera master schedule.

Intermediate EPC Schedule

The intermediate EPC schedule details the start and completion dates for major project units' activities, optimizes the schedule to planned business objectives, identifies the critical path(s), and becomes the basis for all other schedule preparation and control.

The schedule deliverable identifies a rolled-up summarized design phase (FEED) and detailed Level 2 design engineering, procurement, and construction schedule prepared using Primavera Project Planner and broken down into major categories including ISBL (typically process-related units) and OSBL (typically utility-related).

The schedule depicts the following key activities:

- Design engineering;
- Procurement cycles (MRQ, bid, evaluate, award, and delivery);
- Subcontracts;
- Construction; and
- Mechanical completion.

The overall schedule provides an EPC snapshot of each unit and the relationship of each unit with the rest of the project.

A hierarchical system of schedules will be used with each succeeding level to target the milestones as established in the higher levels of schedule.

At the top of the schedule hierarchy is the Level 0 Major Milestone Schedule. It indicates summary engineering, procurement, and construction activities for each of the main plant areas. It is intended to give management an overview of the project schedule status and display the primary contractual schedule obligations between Bechtel and Owner. This schedule is prepared and maintained by project controls within the PMT utilizing milestones scheduling software.

The Level 1 project management schedule is a bar chart schedule for each major plant areas or units with critical EPC activities reflected.

The Level 3 EP schedules are a detailed CPM network of each unit specified. These Level 3 schedules are prepared using standard and defined coding structures to allow summarization to Level 2 schedule and inter-plant area interface. The coding structure is established by our team and approved by Owner's Project Controls to coincide with their internal reporting requirements. Primavera is the software utilized for detail FEED and EPC schedules.

Another project controls primary deliverable is a complete set of detail, Level 3 EPC schedules. These schedules are developed with a defined coding structure to facilitate summarization of identified schedule interfaces. Identification of primary and secondary critical paths will be included. Construction job hours and quantities are resource loaded to these schedules to facilitate detail construction planning. See Figure 2.3.1.2.c.1 below for a depiction of the schedule hierarchy.

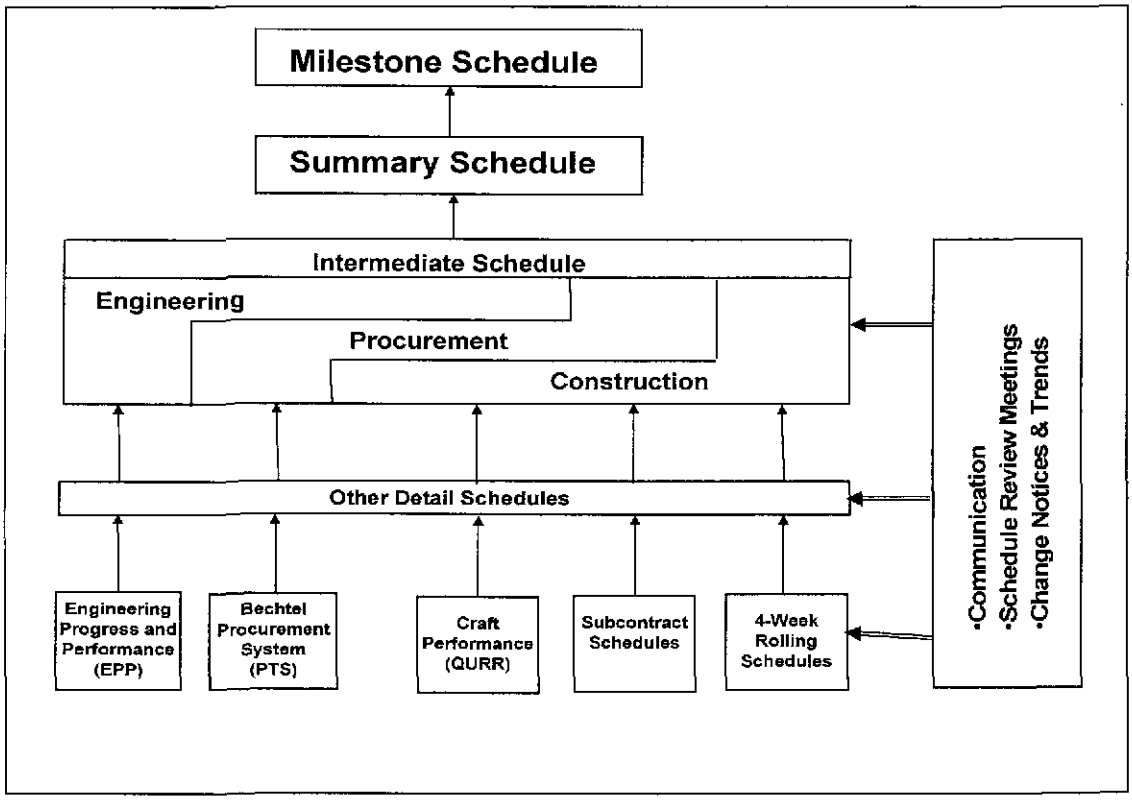


Figure No. 2.3.1.2.c.1 Schedule Process

Project Forecast Manpower Staffing Projections

Staffing plans for home-office staffing will be forecasted in conjunction with scheduled activities as defined during the FEED and EPC phases. The staffing plans also reflect the field staff requirements to support both the module and site work planned over time. Once the schedule is further detailed, the objective will be to analyze the manpower requirements to support the schedule in a level and efficient manner.

Progress Measurement

Progress measurement for all phases is based upon physical progress for each of the deliverables according to a set of weighted values, allocated based upon the level of effort required to complete. The actual calculation for monthly progress is made by assessing the percent complete of each deliverable in terms of earned value, and then multiplying this percentage by the weighted percentage of the total of that specific phase of work. The same approach is applied during the FEED estimate phase continuing through the EPC phase.

To measure progress over the duration of the each phase, a planned percent-complete curve is established by evaluating the planned development and completion dates for each deliverable as identified in the baseline schedule for that specific phase of work. The planned earned value over the agreed phase duration provides the data for the planned progress curve. The result is a planned progress curve against which actual percent-complete progress is plotted each month based upon completion of physical deliverables.

Lead discipline engineers are responsible for developing listings of their deliverables and for reporting actual physical progress in their respective areas as the project proceeds. To support this, project controls uses a progress reporting database that identifies the engineering deliverables and their planned development/completion dates. On a reporting-period basis, each discipline provides project controls with the status of actual achieved progress for each deliverable plus a forecast of the development/completion dates if different from the baseline plan. Project controls assembles the status input and provides the project with a consolidated status report.

Project controls supports the progress monitoring function through the routine update of the project schedules and is responsible for final assembly of progress data and percent complete calculations. Our project controls team uses an existing standard control point system to determine actual progress credit for each deliverable during the engineering phase. Each discipline has published standards for these measurements that are used for each deliverable as the basis for determining progress credit. During the construction phase, actual installation progress is tracked and calculated by actual installed quantities. A commodity family of progress curves is established prior to the start of construction and is used to assist in tracking progress. These progress curves are directly tied into the project integrated schedule. At the appropriate time, the progress curves are translated into system installation and progressed accordingly.

2.3.1.2.c.ii COST MANAGEMENT

The project controls manager coordinates the incorporation of a budget breakdown into the cost systems. The budget is broken down into components appropriate to track costs and commitments (labor, materials, subcontract cost, payroll, travel, and other direct and indirect costs). Cost control is accomplished by timely response to the results of monitoring and analyzing expenditures against this budget during all phases of the project. Schedule status meetings and monthly progress reports are used to communicate progress and performance against this budget throughout the project.

A cost control procedure is implemented immediately following kick-off. This includes cost and commitment tracking and home-office services cost control during the FEED and EPC phases.

The original budget for FEED baseline control will be established between Bechtel PMT and Owner. As the FEED progresses, the project will introduce the terms current budget and trend forecast. The current budget equals the original budget, plus approved scope trends (change orders). The trend forecast equals the current budget, plus all approved non-scope trends and all pending trends. Change orders are changes to the scope, schedule or intent of the project.

Project Controls assists in contingency management. A contingency usage plan is developed and maintained in conjunction with the change management program in order to continually analyze the adequacy of the budgeted amount of contingency. This provides a mechanism to forecast the remaining degree of risk associated with the project.

A total project cash-flow program is established to communicate to Owner the anticipated cash requirements and timing that represent the most accurate picture of the project's financial obligations.

This cash flow encompasses all aspects of cost for the project over time as per the agreed baseline schedule.

Project Controls tracks and reports project services costs. Tracking, verifying, and reporting job hours and costs against budgets, which are assigned to the associated individual unit managers, controls our services costs.

A staffing plan is maintained that shows the overall staffing levels anticipated for each reporting period of the project, organized by engineering discipline/functional department and by office as defined in the work breakdown structure (WBS).

Job hour charges will be tracked by using labor distribution systems and reports, job hours will be loaded into a common system. Bechtel systems are Oracle-based, providing a common platform for data integration (see Figure 2.3.1.2.c.2). These systems will provide the details of each individual job hour charge, including employee name, employee number, department code, and activity code. Labor distribution reports will be issued on an agreed reporting period basis. The responsible managers and the project controls supervisors will each receive a copy of the reports for review and comment.

Salaries and other expenses will also be tracked using the cost-control systems and reports and will be compiled into a common system managed and controlled by the project controls PMT team. These will then be compared against budget information for cost-analysis purposes.

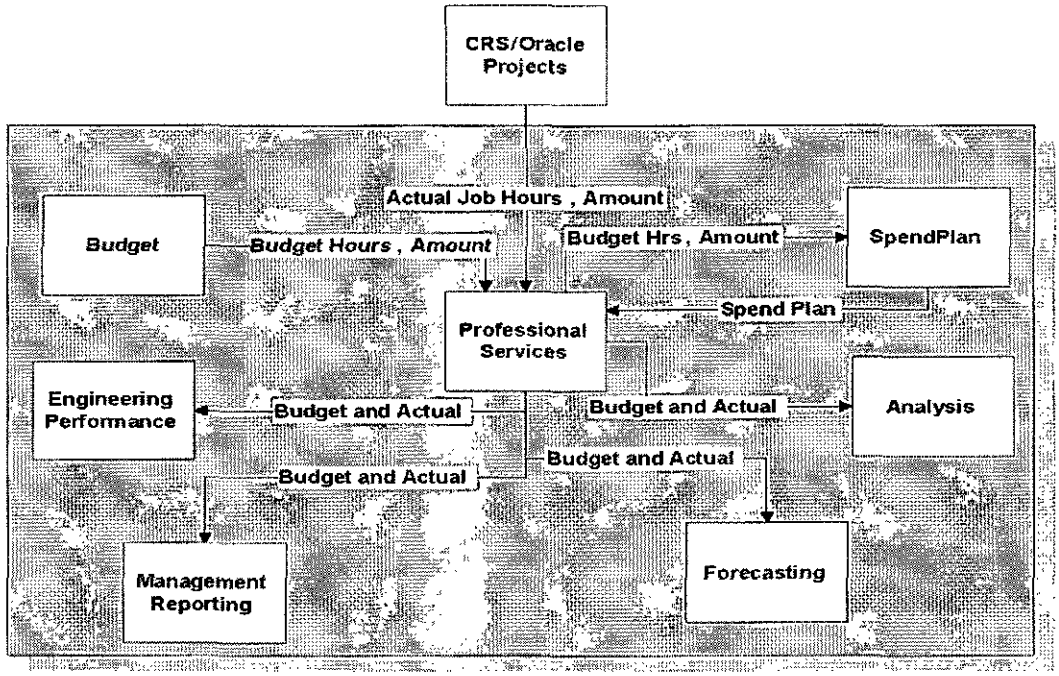


Figure No. 2.3.1.2.c.2

subcontract value. A monthly subcontract cost forecast worksheet is prepared by the project controls engineer assigned to the particular process unit scope of work and coordinated with the subcontract administrator (contract status report). These forecasts are consolidated monthly and included in the monthly cost report. The project controls engineer provides a monthly status of invoices and a forecast of

future progress payments. All reporting by sub-contractors will apply the appropriate WBS and code of accounts.

All material or equipment purchases for the project are controlled and reported by the appropriate WBS and code of accounts. A monthly cost and commitment register will be prepared by the appropriate Project Controls engineer and summarized by the PMT.

Project Controls coordinates with Owner in monitoring and reporting committed and actual costs against approved budgets and forecasts for the respective area of responsibility. Project cost and commitment ledgers are established and issued to the project for tracking and control. The cost and commitment system allows the project to record and monitor transactions as commitments are made and invoices and progress payments are paid. Commitments are compared to budgets, forecasts, and costs as part of the monthly analysis process. Each commitment and payment for equipment, material, labor, and subcontract are recorded in the cost and commitment ledgers. Each transaction is coded to the appropriate project code of accounts cost code. Actual cost and commitment information supports periodic cost forecasts and cash flow projections. See Figure 2.3.1.2.c.3 below for a representation of the integration of the cost control systems.

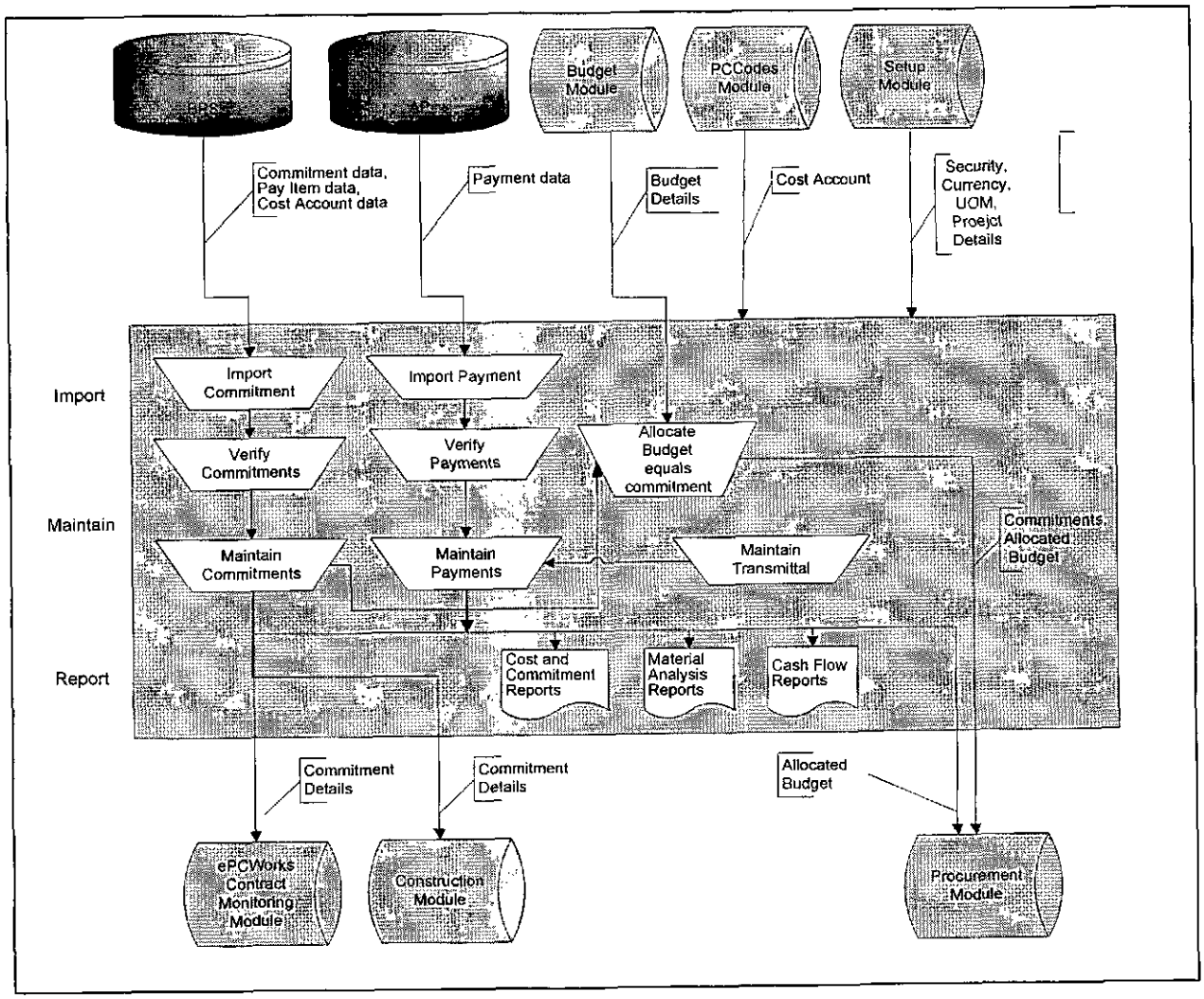


Figure 2.3.1.2.c.3 Cost Control Systems

Cost Estimating

The FEED ±10 percent estimate is one of the primary deliverables of the FEED phase. This estimate is delivered to Owner in order to support the FERC Open Season process and final investment decision (FID). The estimate is prepared in detailed fashion from material take-offs (MTOs) prepared by engineering, plus material and equipment pricing obtained by procurement. Construction labor installation rates, wage rates, construction indirects, and field non-manual services are established by construction. A services estimate is prepared by project controls from job hour input by all disciplines and departments applied to contractual rates. All other items, such as freight, Owner's cost, taxes, escalation, and contingency, are included.

The estimate is prepared utilizing our estimating system in accordance with the project WBS and code of account including, if applicable, cross-reference to Owner's code of account.

The function of cost estimating is organized under a lead project estimator within the PMT and supported by discipline estimators, as appropriate. The lead project estimator will prepare a detail estimate plan consisting of methodology by plant area and commodity, a detailed division of responsibility matrix, discipline deliverables matrix, and schedule prior to kick-off of the estimat

The responsibilities of discipline estimators (instruments, piping, electrical, and civil/structural) include:

- Review and fully understand the scope of work;
- Review all pertinent specifications, plot plans, PFDs, P&IDs, line lists, etc., that affect the discipline;
- Ensure that engineering's deliverables conform to the criteria as outlined in the estimate execution plan;
- Verify and analyze unit pricing information received from all sources to ensure the information is compliant with project specifications;
- Quantify, organize, and summarize material take-off and costing information in accordance with the parameters outlined in the estimate execution plan; and
- Execute estimates using specific construction experience.

The project controls organization coordinates the preparation of all estimates based on the following guidelines:

- An estimate plan is developed to address the responsibilities and methodology for estimating various portions of the project, including home office costs, equipment costs, bulk material costs, construction costs, temporary facility costs, shipping costs, insurance costs, etc.
- Estimate procedure is based on AACE International Recommended Practice No. 18R-97, "Cost Estimate Classification System—As applied in Engineering, Procurement, and Construction for the Process Industries"
- An estimate kick-off meeting with the project team members is conducted to reach an understanding of the purpose of each estimate and acceptance of the estimate plan by all team members.

The FEED and EPC estimate for this project is submitted at the end of the FEED phase. The approved FEED estimate and schedule will become the basis for change management control (trend program) during the EPC phase of the project. The driver of estimating is to mitigate the impact of any changes that do not add to the project's economics. This emphasis is carried through the EPC phase of the project.

23.1.2.c.iii SCOPE AND CHANGE MANAGEMENT

Project Controls manages and controls a trend change management program. Total project scope and cost trends are monitored against the current approved scope and budget during the project execution. To effectively control changes that impact cost and schedule performance of the project, the project team adopts change management procedures, including a trend program. The trend program is a tool for controlling change and identifying the cost and schedule impact of scope and non-scope deviations from the FEED and project total installed cost (TIC) scope. By providing the approximate cost and schedule impact of deviations and potential changes during the decision-making process, the trend program prevents cost and schedule surprises and facilitates forecasting of project cost.

Project Controls conducts trend meetings on a regular basis to review trends generated during the period and issue a confirming monthly trend report, which includes a cumulative summary of change. The trend program supports the management reporting of capital costs, Bechtel services costs, and schedule milestones by providing a historical record of change and a continuous monitoring of likely cost-at-completion and likely milestone completion dates. Early and timely identification of deviations is absolutely necessary to allow for proactive discussions regarding issues that have cost and schedule impact. Owner approval is obtained prior to executing any scope deviation or change. See Figure 2.3.1.2.c.4 on the following page for the depiction of the change management system.

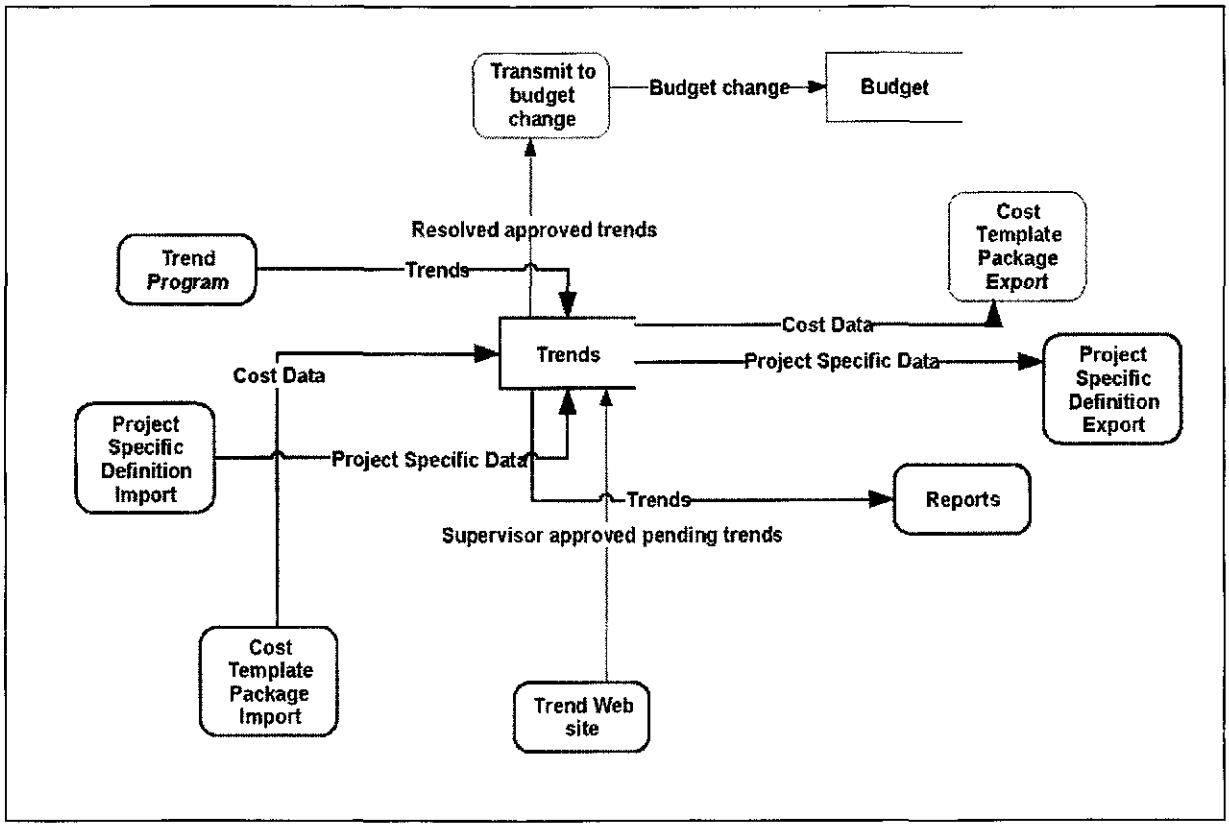
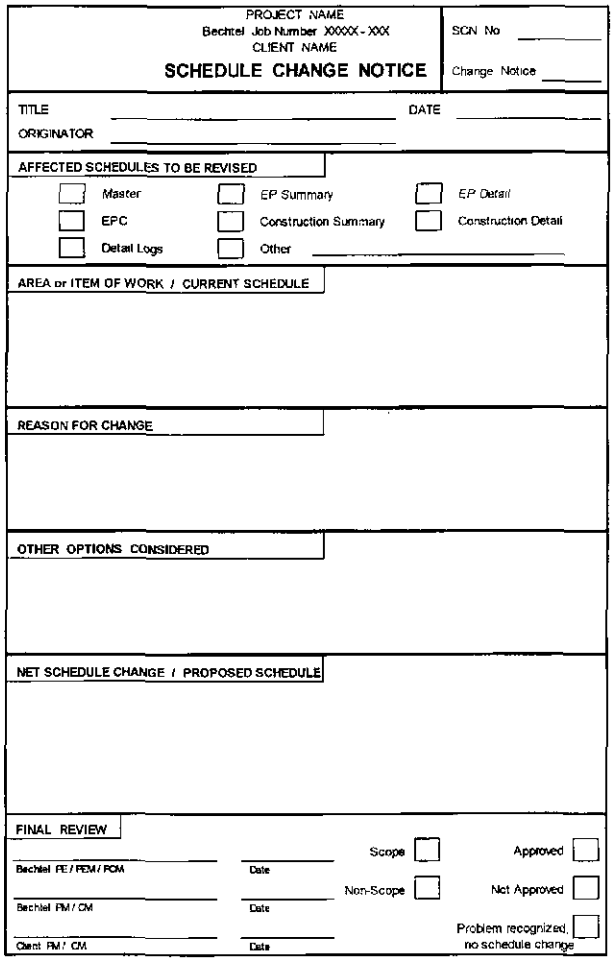


Figure 2.3.1.2.c.4 Change System

A system will be in place to identify any change to scope, cost and/or schedule. The identification of change is a cost and schedule change notice. A schedule change notice (example below) is a proposed adjustment to the schedule that impacts the project Level 1 schedule or project Level 2 milestones. Target or baseline schedules are only changed through use of the SCN process. All SCNs are reviewed by the project controls PMT and approved by the Bechtel, and Owner program directors. The same process is applied to change in cost also and a cost change notice is issued.


PROJECT NAME
Bechtel Job Number XXXXX - XXX
CLIENT NAME
SCHEDULE CHANGE NOTICE

SCN No _____
Change Notice _____

TITLE _____ DATE _____
ORIGINATOR _____

AFFECTED SCHEDULES TO BE REVISED

☐ Master ☐ EP Summary ☐ EP Detail
☐ EPC ☐ Construction Summary ☐ Construction Detail
☐ Detail Logs ☐ Other _____

AREA or ITEM OF WORK / CURRENT SCHEDULE

REASON FOR CHANGE

OTHER OPTIONS CONSIDERED

NET SCHEDULE CHANGE / PROPOSED SCHEDULE

FINAL REVIEW

_____ _____ Scope ☐ Approved ☐
Bechtel PE / PEM / PCM Date
_____ _____ Non-Scope ☐ Not Approved ☐
Bechtel PM / CM Date
_____ _____ Problem recognized, no schedule change ☐
Client PM / CM Date

Figure No. 2.3.1.2.c.5 Sample Change Notice

2.3.1.2.c.iv RISK MANAGEMENT

Project risks include cost, schedule and plant performance risks. Quantification of the appropriate amount of risk money for each of these categories is desired. An evaluation will be made to attempt to remove unnecessary project costs. Suggestions offered by the contractors are solicited and a willingness to work together to find the optimum allocation of risks is desired by the sponsors.

The EPC phase of the project presents a wide range of specific risks and a broad spectrum of potential profiles for the allocation of risks among the parties. Basic categories of risk during the EPC phase are:

- Cost
- Schedule
- Plant performance
- Commercial (e.g., warranty)

A small integrated team, including both technical and commercial specialists from the sponsor organizations and Bechtel, will undertake a systematic process to expand these general categories of risk into an appropriate level of detail, for inclusion in a risk allocation matrix similar to Figure No. 2.3.1.2.d.6 included at the end of this section. Using the risk allocation matrix, a range of EPC contracting options and sponsor-financing strategies can be evaluated to arrive at an optimum overall commercial approach for the project.

The risk allocation profile will vary depending on contracting approach, but in general, determinations of appropriate risk allocation will be guided by a few key principles:

- Each risk is borne by the party best able to manage and mitigate it;
- Rewards commensurate with level of risk assumed;
- Each party is given incentives to perform throughout the term of their involvement in the project;
- Avoid late-stage dis-incentives due to a party's inability to positively influence a particular element of risk;
- Lenders will be skeptical of parties assuming risks they cannot manage or mitigate; and

As a practical matter, the party to bear responsibility for each element of risk and the degree of commercial exposure for any particular risk will be determined based on a number of factors, including:

- Dollar value of proforma impact if the outcome of particular risk parameter is worse (or better) than base case;
- The party's technical and logistical capabilities to influence the outcome of the specific risk parameter;
- Commercial reward available versus the commercial penalties (e.g., revenue/profit available for achieving base case outcome; bonus opportunity for outcome better than specified; etc.)

This process must start at initial award be continually updated and tracked to arrive at an optimum commercial structure. The following matrix is for illustration purposes only and not intended to be a complete representation of project risks.

RISK ALLOCATION MATRIX (SAMPLE)

Risk	Bearer of Risk				Mitigating Factors
	Cont.	Spon.	O&M	E/T	
Permits • Wetlands, air, water • Impact on construction start • Operational compliance					
Completion delay • Mechanical completion • Commercial operation • Site mobilization impacts (e.g., permit availability) • Input and offtake agreements and facilities in place to support plant start-up and testing					
Price • Bulk quantities • Equipment and materials • Labor					
Inputs • Fuel availability • Utilities • Quantity, quality, variability					
Generation plant performance on natural gas • Output • Heat rate					
Gasification plant performance • Solids and hydraulic throughput capacity • CO2 removal • Reliability/availability					
Other execution risks • Design changes • Force majeure • Subsurface conditions • Pre-existing hazardous waste					

Legend

Cont. = EPC Contractor
Spons. = Sponsors
O&M = O&M Contractor
E/T = Equipment or Technology Supplier

Figure No. 2.3.1.2.c.6

Stra

Considering the global approach of day-to-day interaction of our business, the project controls systems has adapted to multi-office integration and execution. Our project controls systems provide for total electronic integration interchange of data. On the Alaska Infrastructure Project, project controls sets up

its typical systems to be able to interact on location and remotely send and receive data. This interaction occurs seamlessly between Bechtel main offices, execution centers, module fabricators, subcontractors and PMT. The systems are set up with security and will allow access to each group. The data is assembled via Oracle and flat-file interchange platforms. The interaction can be accessed via Citrix servers to enable live interaction and interface. The details will be included in the project controls execution plan.

Bechtel Project Controls will have a key role in the success of the Alaska Infrastructure Project. The understanding of the work scope, coupled with the clear direction of a schedule-driven project at minimal cost, is the goal of the project controls team. Bechtel Project Controls, working closely with the PMT and Owner will provide the necessary tools in order to achieve this goal and will constantly look for better ways to control and analyze not only where the project has been and where it is currently at, but continue to adequately forecast where the project is headed.

2.3.1.2.d RESOURCE MANAGEMENT

Maximum use will be made of shared resources, including construction plant, camp facilities, fuel, water between the various groups responsible for the elements of the project. The program management team will maintain an overview of the total resources and carry out a routine review of the status and current and future requirements. They will ensure that resources are allocated on the basis of priorities. Their objectives will be to make the most efficient use of what resources are available and to prevent duplication of effort or expenditure between different execution groups.

2.3.1.2.e WORKFORCE MANAGEMENT

The labor required for each element of the project will be estimated in detail, including the various skills required, the timing, and the source of labor. A prime objective will be to determine where labor can be sourced from within the state of Alaska and to develop and utilize those resources and skills preferentially. Labor agreements will be set up to provide consistency across the different project elements, and Bechtel will adopt a flexible approach to making the best use of the overall resource such that shortages in one area can be supplemented from another at different times in the life of the project. In addition to consistency in rates, terms and conditions, Bechtel will ensure that a satisfactory level of accommodation is provided for all personnel working on the project, including recreational facilities. It is recognized that the existing infrastructure in Alaska would be inadequate for the size of workforce that will need to be accommodated, and whilst the project will provide opportunities for Alaskan businesses in providing support services, excessive impact on Alaskan communities resulting from a large influx of workers would be undesirable.

2.3.1.3 ENGINEERING EXECUTION PLAN

Overall Approach

Bechtel will assemble a project engineering team with expertise in the design, procurement, and construction of natural gas pipelines, compressor staions and LNG plants. Representatives from the Owners' organizations will be integrated with Bechtel personnel into a seamless team. The core team members will be dedicated to the Alaska Infrastructure Project Supplementing this group will be internal and external consultants with expertise in arctic engineering, materials engineering, and construction. The team will be organized under a project engineering manager who will report directly to the project manager. The project engineering manager will be the single point of contact for all engineering work.

The project engineering team will design a safe, reliable, and cost-efficient pipeline system for the transportation of natural gas from the North Slope and the LNG Plant.

The work will be initiated with a kick-off meeting to introduce personnel, define the scope of work, and initiate the information flow between Bechtel and the Owners' organization(s). Engineering requirements for site visits and surveys will be defined. Project schedules, manpower, and automation plans will be established by engineering discipline.

Communications between various engineering groups will be open and informal to promote free exchange of technical ideas. Technical decisions will be made in a formal manner, however, in accordance with written and approved project procedures.

The project engineering team will be located in Bechtel's home office and will perform the major portion of the engineering work there. Towards the completion of the detailed design, the project engineering manager will relocate to Alaska to support the construction effort

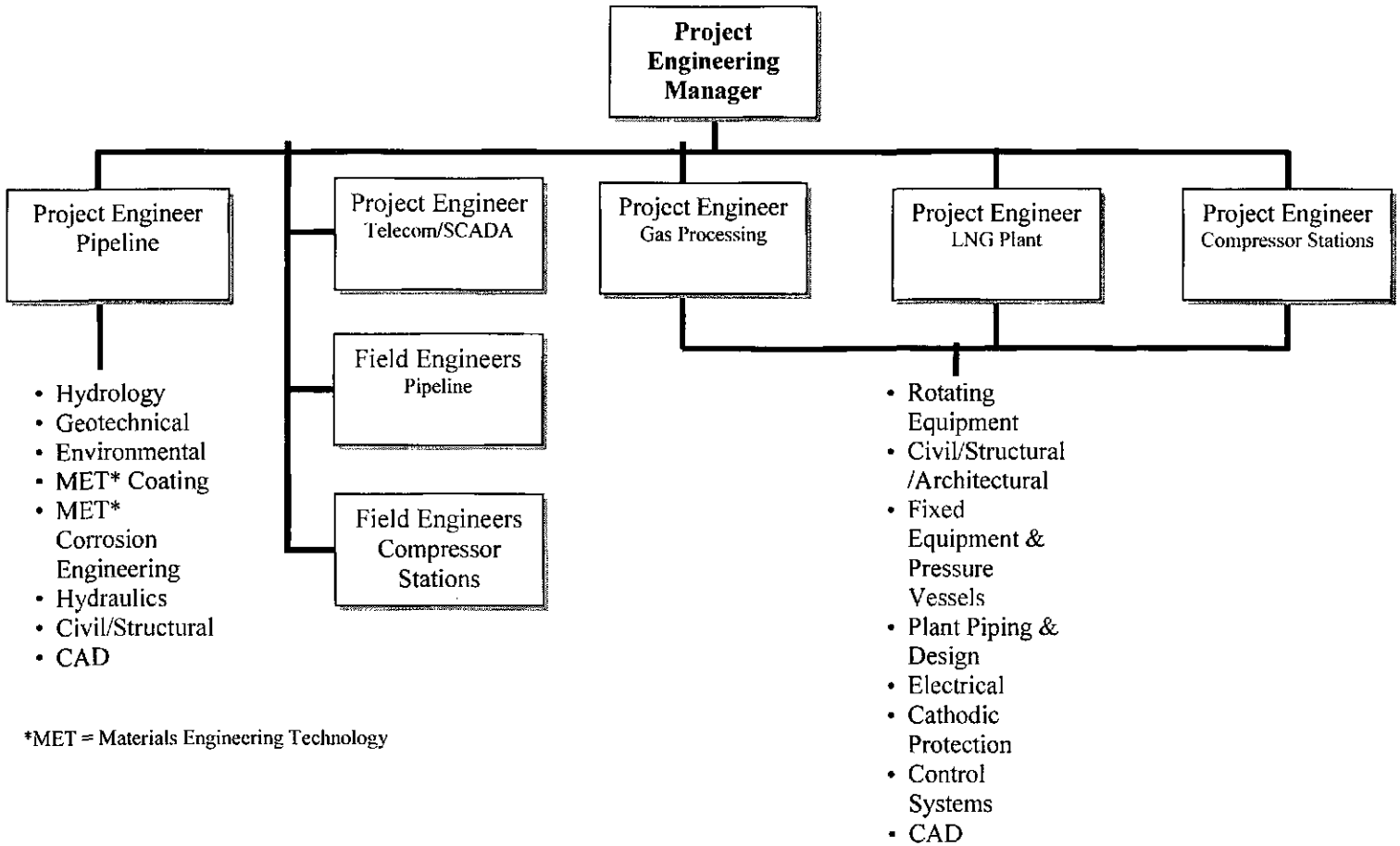
ORGANIZATION AND STAFFING

Project Engineering Management

The project engineering manager will lead the engineering design effort. Project engineers will report directly to him. He will have the responsibility for schedule, cost, and quality of engineering design. The project engineering manager will maintain a clear definition of the project scope and advise the project team of approved changes. He will prepare the Engineering Execution Plan and establish work plans and manpower requirements.

Figure 2.3.1.3.1 shows the Project Engineering Organization in the home office.

Engineering
Home Office



*MET = Materials Engineering Technology

Figure No. 2.3.1.3.1 Engineering Organization

Project Engineering

Project engineers will be supported by discipline engineering specialists, and will have prime responsibility for all engineering deliverables in their respective areas. Project Engineers will coordinate the efforts of all design engineering groups and place particular emphasis on the timely flow of information between groups.

Project engineers will be coordinate the timely execution of engineering deliverables, as defined in the project schedule, by all engineering disciplines. These include the following:

Design Drawings

Design drawings to be prepared under the auspices of the home-office engineering team include the following:

- Pipeline alignment sheets
- Process flow diagrams
- Piping and Instrument drawings
- Plot plans
- Piping plans and sections
- Piping isometrics
- Electrical single-line drawings
- Hazardous area drawings
- Logic diagrams
- Building plans
- Installation details

Specifications

The home-office engineering team will prepare all material and equipment specifications for the project.

Material requisitions

Material requisitions for critical long-lead items will be prepared on a priority basis. Engineering will be cognizant that, in most cases, identifying the most viable supplier with a competitive price and acceptable delivery schedule at the earliest possible time is crucial for the successful completion of the project. The exact quantities and other minor details will be resolved at the time of purchase order issue. In view of the demanding schedule of the project, material requisitions will be processed with a pragmatic and flexible approach.

Construction Subcontracts

Project Engineering will be responsible for preparing the scope of work and construction specifications for five major pipeline spreads, five compressor stations, the Anderson Bay delivery terminal and the Anderson Bay LNG Plant. These contracts will be as follows:

Pipeline Construction – Spread 1 from MP 0 to MP 180

Pipeline Construction – Spread 2 from MP 180 to MP 354

Pipeline Construction – Spread 3 from MP 353.5 to MP 540

Pipeline Construction – Spread 4 from MP 540 to MP 699

Pipeline Construction – Spread 5 from MP 699 to MP 806

Project Engineering will be responsible for preparing scope of work and construction specifications for five compressor stations and the delivery facility at the Anderson Bay LNG Plant.

These contracts will be issued for bid and responses will be evaluated within the first four to five months of the detailed engineering phase. Project Engineering will start this work immediately and staff accordingly to meet the schedule requirements.

The Project Engineering group will develop field engineering procedures.

The Engineering group will be organized as a task force to facilitate inter-discipline communication and coordination. The task force will be supported by off-project groups and specialists as needed. Technical oversight will be provided by engineering functional management in accordance with Bechtel standard procedures.

All detailed engineering will be executed in the home office.

The Engineering Task Force will be led by the project engineering manager (PEM) who is responsible for the quality, cost, and schedule of Bechtel's overall engineering effort. He will maintain a clear definition of the project scope and advise the project team of approved changes.

In addition to supervision of the task force, the PEM will be responsible for:

- Establishment and monitoring of engineering goals and objectives;
- *Preparation of the Project Engineering Procedure Manual* (PEPM);
- Preparation and maintenance of the engineering organization chart;
- Ensuring compliance with the contractually defined scope of work (SOW) and managing change;
- Ensuring adherence to budgets, schedule, and project procedures; and
- Establishing and maintaining communications and coordination between engineering, other Bechtel functional groups, client and vendor representatives.

The PEM will be assisted by two or more area project engineers (APEs) responsible for specific areas of the plant such as ISBL, OSBL, and perhaps, special interfaces and/or other project requirements. The APEs will have primary responsibility for all engineering deliverables within their area, and will coordinate the efforts of the discipline groups on a task basis. The APEs will place particular emphasis on the timely preparation and flow of design information among the discipline groups in order to issue engineering deliverables to meet the overall EPC schedule.

The APEs' primary responsibilities will include:

- Review of all engineering documents to ensure consistency;
- Scheduling and conducting electronic 3D model reviews, HAZOP reviews, and audits;
- Assisting with the development of work plans, staffing requirements and project procedures;
- Ensuring compliance with project standards, specifications and procedures;
- Coordinating activities of design disciplines to ensure that engineering activities support the project schedule and budget; and
- Resolving cross-discipline design problems.

The APEs will work closely with the appropriate Engineering Group Supervisors (EGSs) in the development of subcontracts and participate in the bid, evaluation and award cycles.

The EGSs, reporting to the PEM, will be responsible for the budget, schedule and quality within their discipline, as well as interaction with other groups on the project team, including client representatives. EGSs will deal directly with their client counterparts on technical matters. All schedule and cost issues *will be addressed through the* APEs.

All material take-offs (MTOs) will be conducted on the project under the supervision of the respective discipline EGS.

Engineering will prepare all material and equipment requisitions (MRs), technical bid evaluations and assist in award recommendations in accordance with Bechtel Standard Procedures and specific project procedures. Each discipline EGS is responsible for coordination and schedule of MRs handled by their discipline.

The document control supervisor, who also reports to the PEM, is responsible for issuing and maintaining records of all engineering drawings, documents, material requisitions and supplier documents on the project.

Divisions of responsibility (DORs) will be prepared by each discipline EGS and coordinated with their functional management and the project team to ensure a clear interface of responsibilities to meet the project schedule and scope of work management. Each EGS will be responsible for managing the relationship and scope of work as defined on the DOR, including the managing of man-hour budgets, schedules, and deliverables.

ENGINEERING SPECIALISTS

Process Engineering

The Process Engineering group's primary responsibility will be development of the process design basis. Key activities of the process group will include:

- Development and maintenance of the process and utility flow diagrams (PFDs and UFDs) and their related heat and material balances (HMBs) and utility balances;
- Development of the preliminary equipment list;
- Preparation of the initial equipment data sheets;
- Provide input to equipment material selection guide;
- Perform process safety analyses and develop relief load data for sizing relief devices;
- Support the HAZOP team;
- Define and review process control philosophy to ensure conformance with operating requirements; and
- Support the process systems, plant design and control systems groups by reviewing process and instrumentation diagrams (P&IDs), 3D modeling, control valve data sheets, and instrument data sheets.

Process Systems

The Process Systems group will be responsible for development and issue of the following project documents:

- Process and instrumentation diagrams (P&IDs);
- Line designation tables (LDTs);
- Equipment lists;
- Pump calculations;
- Specialty piping (SP) items lists;
- Pressure profiles;
- Relief device and specialty piping item data sheets; and
- Hydrotest diagrams

The Process Systems group will also be responsible for the following:

- Coordination of all P&ID reviews;

- Coordination of HAZOP reviews and resolution all resulting action items;
- Hydraulic calculations, including water hammer analysis;
- Relief device sizing and requisitioning;
- Line-by-line reviews of the 3D model;
- Providing input for scope of fireproofing and/or cold protection of structural steel and equipment supports; and
- *Identifying equipment requiring fire protection, and the required active/passive safety design* systems.

The Process Systems EGS is responsible for coordination of all changes to the P&IDs and, after the design issue, the implementation of the change management program.

Pipeline Hydraulics Analysts

Hydraulics analysis engineers will validate the results of the FEED by updating the analyses previously completed for the final gas composition(s), pipeline route, and compressor station locations, including milepost and ground elevation. Also, any change to turbine-compressor unit sizes will be considered in the analysis.

Mechanical Engineering

The Mechanical Engineering group will be responsible for preparation and/or maintenance of the following deliverables:

- Equipment specifications;
- Mechanical data sheets;
- Equipment material requisitions;
- Equipment orientation drawings;
- Review/approval of vendor prints;
- Pre-award/post-award meetings with selected vendors to cover detailed review of equipment, specifications, and engineering document submittal requirements;
- Review of all equipment vendor documentation for compliance with project requirements and incorporation of discipline comments into the reviewed documents;
- Purchase of capital spares as requested by the client and start-up spares based on the manufacturer's recommendations; and
- Coordination of vendor representative requirements with construction and start-up personnel to determine their duration and timing.

Fixed Equipment (Heat Transfer and Pressure Vessels) Engineering

The Fixed Equipment (heat transfer and pressure vessels) group will update and confirm the existing material requisitions with vendors for multi-cyclone separators, gas coolers, and refrigeration equipment. This group will also prepare additional material requisitions, evaluate proposals, and make recommendations for purchase of other equipment. The group will also review vendor drawings to ensure compliance with project specifications and will provide vendor data for other engineering disciplines.

Rotating Equipment Engineering

A complete set of machinery specifications will be developed initially based on industry standards (API, ANSI) and then supplemented with Bechtel's standards to produce job-specific documents.

The equipment data sheets and requisitions will be updated for quotation, and preliminary equipment plots and utility data will be prepared to allow engineering to proceed prior to actual placement of purchase order.

Equipment quotations will be reviewed for compliance to specifications and suppliers recommended for purchase. Requisitions and data sheets will be prepared for purchase.

Upon commencement of detailed design, with purchase orders placed, the rotating equipment group will review vendor equipment design and drawings to ensure conformance to specifications. They will also interface with all design disciplines to ensure that information is available to support the level and detail of their design effort. The group will participate in vendor coordination meetings. They will also witness equipment tests in vendor shops to ensure equipment meets performance guarantees; provide construction support as needed to clarify design intent; and answer questions and assist with project close-out and start-up as needed.

Environmental Engineering

The project will be conducted in an environmentally sound manner and in compliance with all relevant State of Alaska and federal environmental laws and regulations, Bechtel's environmental policies and all contract stipulations. Environmental compliance is critical to the success of the.project.

The environmental engineer has overall responsibility for assuring design compliance with environmental laws, regulations, permit conditions and contract conditions relating to waste management and environmental issues.

An environmental design basis for the project will be prepared covering applicable regulations and environmental design criteria.

Other environmental activities will include:

- Definition of permitting requirements;
- Assistance in preparation of the permits and license applications;
- Preparation of design documents which specify the environmental controls that will be incorporated into the engineering design;
- Identification of environmental issues that may affect construction;
- Preparation of a construction environmental control plan;
- Development of an air emissions inventory;
- Coordination of noise and pulsation control work, modeling and studies; and
- Assistance in coordination of safety studies and risk assessments.

Civil/Structural/Architectural (C/S/A) Engineering

The Civil/Structural/Architectural group will obtain and review site and soil data and prepare detailed design for all foundations, structures, access platforms, buried electrical trenches, and miscellaneous shelters for equipment and personnel. The C/S/A group will also coordinate with Plant Layout and Piping to locate underground structures and piping. The group will provide necessary input for the formulation of the construction subcontracts. The C/S/A group will be consulted for the design of the construction pad along the pipeline right-of-way.

Civil Engineering will immediately begin preparing the engineering documents, specifications, and scope of work statements for the following subcontractor activities:

Pipeline Route Surveys

Civil Engineering will prepare the necessary documents for conducting aerial and ground surveys. As required, engineers from Project Home Office will be assigned to supervise the subcontractors' survey teams conducting the ground surveys.

Subsoil Investigation Surveys

Civil Engineering will prepare the necessary documents for subcontractors to conduct subsoil surveys. These surveys will be done to identify rock ditch requiring blasting, floodplain and wetlands requiring buoyancy control, and road and river crossing evaluations for determining the appropriate method of crossing. The subsoil survey work may be contracted to local soils survey companies. As required, geotechnical and/or hydrological engineers will be assigned to manage and monitor the subsoil survey contractors.

Pipeline Alignment Sheets

Civil Engineering will supervise a subcontractor's preparation of 1:2400 scale GIS-based alignments sheets based on the results of the detailed ground survey of the pipeline route and digitally rectified aerial photography produced by an aerial survey subcontractor. At 1 inch = 200 feet, each full-sized 36-inch x 24-inch drawing will cover approximately 6,000 linear feet of pipeline, resulting in approximately 700 alignment sheets. These drawings will be required to complete the pipeline construction subcontract packages.

Plant Design and Piping

The Plant Design and Piping (PD&P) group's primary responsibilities will be the development and maintenance of the project 3D model based on the planning studies approved during the FEED stage of the project, the specification all required piping materials, and the generation of purchase/subcontract documents for acquisition of that material.

Other key PD&P activities and deliverables will be as follows:

- Development of the project overall plot plan, unit plot plans, and equipment location plans;
- Preparation of the project piping material specification;
- Extraction of piping isometric drawings for all ¾-inch and larger piping from the 3D model;
- Preparation of stress analyses for all critical piping using proprietary software;
- Design of pipe supports for all 3-inch and larger piping;
- Development of orthographic piping plans for all underground piping;
- Development of trim isometrics in 2D for all equipment trim piping; and
- Preparation of pipe rack loading plans.

The Plant Design and Piping group will prepare plot plans and equipment arrangement drawings. They will develop planning studies including necessary plans and elevations to establish the final layout of equipment and piping with regard to constructability, operability, maintainability, and safety. They will perform stress analysis of required piping systems. Planning studies will be further developed into detailed above-ground and underground piping plans. Piping isometrics will be drawn for all above ground piping 2-inch and larger. Material requisitions for all piping components will be developed and issued for purchase.

Electrical Engineering

The major responsibilities for the Electrical group will be the design of the power generation system and all electrical systems supporting the project, the specification of all required electrical materials and equipment and the generation of purchase/subcontract documents for acquisition of that material and equipment.

The electrical group's activities and deliverables will be:

- Development of the electrical load list;

- Preparation of an overall load flow analysis;
- Preparation of single line diagrams based upon the electrical load list and the load analyses;
- Switchgear building layouts;
- Electrical schematic diagrams;
- Cable sizing calculations;
- Cable tray plans for the feeder and branch circuit power cables and for control system cables;
- Underground electrical cable routing plans;
- Overall grounding drawings;
- Lighting system plans and details;
- Cable schedule and routing; and
- Electrical area classification drawings and details.

The work of the electrical engineering team will be planned and coordinated so the engineering and design of the first three compressor stations can be readily adapted for the subsequent stations. Equipment and material requisitions will be prepared for the first three stations' requirements, but formatted to use for the other stations. Major equipment for all stations will be procured from the same supplier to minimize operator training requirements and spares parts. Equipment and materials for all stations will be procured via an integrated set of requisitions.

Control Systems

The major responsibilities for the control systems group will be the design of the project DCS, ESD systems, and PLC systems and all process and utility control systems supporting the project, the specification of required control systems materials and equipment, and the generation of purchase/subcontract documents for acquisition of that material and equipment.

The Electrical group's activities and deliverables will be:

- Assisting in P&ID development;
- Participating in HAZOP reviews;
- Preparing ESD and control philosophy specifications;
- Preparing instrument index;
- Preparing level coordination drawings (to establish relative heights of level instrumentation for use by plant design and piping);
- Developing cause and effect diagrams based on interlocks shown on the process and utility P&IDs;
- Preparing instrument location plan drawings and junction box connection drawings;
- Developing cable interconnection and terminations;
- Developing standard installation details;
- Developing functional descriptions for complex loops;
- Preparing system interlock test procedures;
- Preparing data sheets for all tagged instrument items;
- Preparing detailed system specifications for DCS, ESD and PLC;
- Performing the PLC system programming based upon the requirements shown on the cause and effect diagrams and the P&IDs;

- Performing the DCS point configuration and graphics design based upon the requirements shown on the P&IDs and associated documents; and
- Incorporating appropriate DCS and PLC configuration information into the control systems *database and the loop diagrams.*

Control Systems engineers will finalize the station/unit control philosophy and assist in the preparation of the P&IDs. They will also develop logic narratives, ladder and loop diagrams; issue material requisitions, datasheets, control cable schedules, and wire lists; and size, specify, and tabulate all instrument tag items and bulks.

Control Systems engineers will prepare location and installation drawings of field instrumentation. They will also prepare graphics for the semi-graphic display panels.

Control Systems will finalize the design requirements for the definition and procurement of the SCADA system. They will prepare system block diagrams, wiring diagrams, control room layouts, graphic layouts, installation details, and location plans for various stations. They will determine interface requirements for the fiber optic cable telecommunications. They will interface with the pipeline SCADA and Telecommunications subcontractor in developing the data transmission and handling requirements, and the computer and remote terminal controller unit configuration and programming design and documentation. They will develop the individual station hardware configurations and power requirements.

Telecommunications/SCADA Engineering

A dedicated team of telecommunications and SCADA experts will be organized under the Telecom/SCADA engineering supervisor, reporting directly to the project engineering manager. This team will function as two groups, operations and projects. The operations group will be responsible for developing subcontracts for satellite and terrestrial communications and data network for the area offices and construction camps. The projects group will be responsible for developing the subcontract for SCADA Integration and all other materials and equipment required for the permanent facilities.

A telecommunications and SCADA project engineer will be located in the home office during detailed design. He will make trips as required to support the field surveys and interact with potential SCADA and Telecommunications subcontractors and suppliers. Upon completion of the detailed design, he will be in residence at the SCADA subcontractor's office to supervise final engineering and to expedite reviews and approvals of the SCADA Integration design.

Document Control

Document Control will issue and maintain record copies of all engineering drawings, documents, material requisitions and vendor supplied documents on the project. Engineering transmits all documents to Document Control using a document transmittal form, with appropriate signatures indicating approvals. Document Control will support other groups with the issue and distribution of other project documents as required.

All originals will reside with Document Control with the exception of project management letters and confidential documents, which will be kept by the project manager's secretary. Any project documents that did not reside in InfoWorks during the duration of the project will be imported into InfoWorks for record retention and turnover. Document Control will lead the process of turnover and close-out in accordance with project management direction.

Material and Quality Services

Metallurgy and Coatings

The preliminary design has been based on API 5L grade X80 carbon steel line pipe. During detailed design, metallurgists from Bechtel's materials engineering technology (MET) group will assist project engineering in finalizing the line pipe specification and by evaluating the chemical compositions proposed by the potential line pipe suppliers. Metallurgists will also be requested to critique the project welding and NDT specifications.

Coating specialists also from Bechtel's MET group will validate the preliminary selections of three-layer polyethylene external coating and internal thin film epoxy paint from technical, cost, and logistical viewpoints. The relative merits of coating the line pipe in the mill or at a portable coating yard in Alaska will be evaluated.

Cathodic Protection (CP) and AC Mitigation

Bechtel's MET group will also supply the project with a corrosion engineer to design the cathodic protection facilities for the project. The following tasks are included:

Soil Resistivity Survey

The corrosion engineer will prepare specifications and subcontract documents for conducting soil resistivity surveys. The soil resistivity survey team will work closely with the pipeline route survey subcontractor. As required, engineers from the home project office will be assigned to the survey teams conducting the soil resistivity surveys.

The corrosion engineer will ensure that the necessary field data for the design of the CP systems is gathered. He will manage the efforts of the soils resistivity survey team. The corrosion engineer will design the cathodic protection system and prepare plot plans and detail drawings, issue construction and material specifications and prepare material requisitions. He will prepare a Cathodic Protection Design Book, commission the systems, and collate all as-built data into a final report.

AC Interference Study

For the AC Interference Study, the corrosion engineer will solicit the necessary data from local public utilities needed for input into those segments of the pipeline alignment that will parallel high voltage electrical transmission systems. The study will be conducted by outside consultants who will define the AC mitigation materials to be installed.

Material and Quality Services group (M&QS) will provide support as required by the project in four major technical areas:

- Metallurgy and welding;
- Paintings, coatings, linings, refractory and nonmetallic materials;
- Cathodic protection; and
- Insulation.

The M&QS group will be responsible for the development and/or review or approval of the following:

- Material selection guides (MSGs);
- Equipment welding specifications;
- Field welding procedures; and
- Cathodic protection design for underground piping.

Safety and Fire Protection Specialists

The safety and fire protection specialists will be responsible for the development, review or approval of the following:

- Fire protection design criteria;
- Firewater system design;
- Method and extent of structural steel / equipment support fireproofing;
- Type and location of area monitors, gas detectors, UVIRs, and other safety equipment;
- Spill containment and spill landing design; and
- Siting study (outside consultant).

Start-up Specialists

The start-up specialists will work closely with engineering and will be responsible for definition of the activities and development of the plans necessary for starting up the plant and its subsequent turnover to the client operations group.

The following deliverables will be prepared by the start-up specialists:

- Pre-commissioning execution plan;
- Commissioning execution plan;
- Start-up execution plan;
- Start-up procedures;
- Operating procedures; and
- Training plan.

Construction/Field Support

Home office engineering personnel will provide engineering support to the construction effort. Requirements for engineering field support will be identified as the project progresses. The area project engineers will coordinate the resolution of all technical issues that arise during the course of construction. Key design engineers will also assist with commissioning and start-up activities as required.

Designated design engineers may be in residence at the site as required to provide support to the construction group through commissioning and start-up.

As-Built Documentation

The respective engineering disciplines will update and issue the following "As-Built" documentation for project close-out, based on construction red-lines:

- P&IDs;
- LDTs;
- Equipment location plans;
- Underground piping drawings;
- Electrical one-line diagrams;
- Electrical area classification drawings;
- Electrical schematics and wiring diagrams;
- Control systems block diagrams;
- Cause-and-effect diagrams;
- Loop diagrams;
- Instrument schematics;
- Connection diagrams (wiring diagrams/databases); and
- DCS/PLC/ESD configuration data.

Document Precedence

The precedence of documents for home office engineering will be as follows (in order from higher precedence to lower):

1. PFDs and their associated HMBs;

2. P&IDs;
3. Applicable industry/government codes and standards;
4. Equipment list;
5. Equipment specifications;
6. Line list;
7. Instrument list;
8. Layout drawings;
9. Instrument specifications; and
10. Scope of work.

Client Approvals

Key documents for client review and approval are listed below:

- PFDs;
- P&IDs;
- Plot plan;
- Underground drawings;
- Electrical area classifications;
- One-line diagrams; and
- Building layout drawings.

Engineering Controls

An engineering man-hour estimate will be established and incorporated into the project budget. The budget will be grouped by standard activity code within each discipline. Work hours expended by each discipline are entered bi-weekly into the payroll system with activity codes.

A detailed engineering schedule will be prepared in Primavera as part of the overall EPC schedule. The detailed EPC schedule will be thoroughly reviewed by the entire task force to ensure the engineering deliverables support the construction effort.

The project controls section in this execution plan defines the details for progress and performance measurement and reporting.

The information will be used solely to aid engineering management and the EGSs in managing their work. Schedule consideration will drive decision-making on job hours to be expended.

Based upon the need for maintaining schedule commitments, engineering disciplines, in conjunction with other task force groups, will reevaluate and adjust their priorities, work plans and forecast work hours as needed. This may involve logic and duration changes to any group's scheduled activities in the project plan. The revised schedule is then run to produce the current forecast.

The initial plan/schedule will not be lost, but will be maintained as a baseline to which future forecasts are compared. New forecasts do not become new schedules.

Field Engineering

Field engineers located in the area and construction offices will support construction and coordinate the interfaces with the home office. The field engineering organization will report to the project engineering manager.

The project engineering group will develop the following field engineering procedures:

- Pre-turnover acceptance criteria of subcontractor's work;
- Installation and/or pre-commissioning;
- System for control and distribution of drawings and documents on-site;
- Soils survey;
- Land survey work, including pre-construction survey and as-built survey specifications;
- Concrete control;
- Quantity control of bulk materials;
- Testing of bolted structural connections;
- Subcontractor's request for information (RFI);
- Field change request;
- Line change notification; and
- Design change

ENGINEERING SOFTWARE

Bechtel Engineering proposes to use some of the following commercially available and proprietary in-house computer programs during the course of design and engineering of the Alaska Infrastructure Project.

COMPUTER PROGRAMS FOR GAS PIPELINE DESIGN

Gregg Engineering

WinFlo. This module calculates the balance steady state pressure-flow relationship for simple and complex piping networks. Winflow solves transmission, gathering, or distribution network systems of unlimited size. The user can interactively view results of the network system as the calculations are converging, thus facilitating the identification of potential failures without waiting for the run to be completed.

WinTran. This module is a real-time transient simulator that can be used to make predictive simulations for use in operational and design studies or as a training tool. As optional modules, WinTran has a leak-detection module, a detailed station and fuel optimization module, an expert system module, and a training simulator. The transient state predictive module evaluates the time-varying pressure-flow relationship for any piping network. This transient simulator operates within a Microsoft Windows interactive graphical interface, and simulates simple and complex network systems having smooth or severe transients.

Scientific Software Intercomp, Inc.

The Transient Gas Network Program (TGNET) is a computer modeling system developed to simulate the dynamic flow of gas in pipeline networks. The pipeline networks may be simple or complex, may have varied elevation profiles, and may include various items of equipment that exist in the field. The simulation involves calculating and reporting response values of important system variables (pressure, flow, power, density, fluid quality, and temperature) at specified locations along the pipeline and at specified time intervals during the simulation.

Stoner Associates, Inc.

Pipeline Simulator. The pipeline simulator can be used to study the hydraulic behavior of a pipeline system and the operation of equipment control systems. Simulation can be performed on proposed systems, extensions of existing systems, surge analysis, and help design an effective control system operation. The pipeline simulator is supported on a wide variety of operating systems.

COMPUTER PROGRAMS FOR WET GAS AND FLOWLINE DESIGN

The fluid dynamics of pipelines carrying gas, gas condensate, and wet gas are analyzed using steady state and transient flow simulators. The principal concern of the possibility of slug flow in the line during both normal and abnormal (start-ups, shut-downs, scraping, reduced rates) operating conditions are addressed. In addition, parameters such as operating power, liquid hold-up, and flow velocities are established. Commercially available programs are used to design two phase or three phase pipeline systems. The programs used are listed below.

STEADY-STATE PROGRAMS

Baker Jardine

Pipesim (Windows version) provides multi-phase flow analysis in wells, flowlines and pipelines. PipeSim is able to produce point-by-point generation of pressure and temperature profiles for single and multiphase systems.

Neotechnology Consultants Ltd.

Pipeflo. Mult-iphase Flow analysis in flowlines and converging pipeline networks.

Multi-Phase Transient Programs

Scandpower

OLGA provides transient multi-phase hydrocarbon flow analysis in wells, pipelines and components. The program is able to predict a range of phenomena including flow rate and thermal transients, severe slugging, start-up/shut-down problems and pipeline depressurization. It solves mass, momentum and energy equations for each phase, using a one-dimensional, finite difference scheme. Fluid physical properties are calculated from user-specified mixture composition using an internal PVT package.

PROCESS SIMULATION PROGRAMS

Hyprotech

Hysim Process Simulator designed for the gas processing industries. For pipeline design, this program is used to generate gas properties, phase envelopes, compressor horsepower and liquid separation and gas mixing facilities.

AIR DISPERSION MODELING

Simulation Sciences, Inc.

The SLAB atmospheric dispersion model uses release characteristics data (i.e., output from a process simulation model such as PRO/II) as input to calculate downwind concentrations of gas releases. Hypothetical release scenarios of flammable gases (such as blowdown from one valve, blowdown from two valves simultaneously, and blowdowns with and without pipeline leak scenarios) can be modeled with SLAB. Output from SLAB provides estimates of the potential ignition hazard zones associated with these scenarios which can be used by the project to determine the distance the project blowdown stacks should be located from potential gas ignition sources (i.e. high-voltage electrical transmission lines and towers). A wide range of meteorological conditions can be input to SLAB to identify potentially worst-case dispersion, and thus, predict the largest potential hazard zones per release scenario.

The SLAB air dispersion model was developed by the Lawrence Livermore National Laboratory. SLAB can simulate vertical and horizontal jet releases, evaporating pools and instantaneous puff releases. Although SLAB is specifically designed to model denser-than-air releases, it will also simulate plume dispersion of neutrally buoyant releases and includes lifting of the plume if it is lighter than air. SLAB also allows the user to account for the release duration and the concentration averaging time.

SLAB is a public domain model which has been subjected to peer review and compared to several field experiments. One study evaluated fifteen hazardous gas models using data from eight field experiments. SLAB was one of seven models that produced the most consistent predictions of plume centerline concentrations across the eight data sets.

The United States Environmental Protection Agency (USEPA) does not recommend a particular model for simulating the release and dispersion of hazardous/flammable gases. However, SLAB is listed as an

alternative air quality model in USEPA's "Guideline on Air Quality Models." SLAB is also listed as a public domain model, available for use, in USEPA's "Risk Management Program Modeling Guidelines."

CATHODIC PROTECTION / AC MITIGATION PROGRAMS

Safe Engineering Services Technologies Ltd.

Current Distribution, Electromagnetic Interference, Grounding and Soil Structure Analysis (CDEGS) various models are used for soil resistivity interpretation, grounding studies, inductive and conductive AC interference and cathodic protection studies.

Bechtel

CPOFFPL (MT008) provides a method to perform design calculations for sacrificial bracelet anode cathodic protection for offshore pipelines.

CPOFFSHORE (MT007) performs design calculations for sacrificial anode cathodic protection for offshore pipelines.

2.3.1.4 PROCUREMENT AND LOGISTICS EXECUTION

2.3.1.4.a PIPELINE

2.3.1.4.a.i PROCUREMENT

Scope

Procurement will perform purchasing, expediting, supplier quality, material management, traffic and logistics, procurement automation, field procurement for the Alaska Infrastructure Project pipeline. We intend to use the work process, procedures and integrated tools that form the basis of our world class/global procurement capability. The personnel assigned to the project all have the necessary experience in the domestic and global markets.

Responsibility

Procurement will be responsible for all procurement activities in the acquisition, delivery and issuance of equipment and materials to the job site through project completion.

Procurement's primary focus will be to ensure that all necessary services, equipment and materials are delivered to the construction location in sufficient time to ensure that there are no delays in the start or completion of construction activities as identified in the Project EPC schedules. Procurement will also be responsible for verifying that the equipment and materials meet the required quality standards prior to delivery to construction and that they are procured at the lowest possible capital cost that will result in the lowest total installed cost.

To accomplish these goals, the procurement organization will use a proactive process to coordinate and interface with engineering, project controls, quality assurance and construction to implement a number of key strategies and action items as described elsewhere in this execution plan.

Organization

Upon commencement of the EPC phase of the project, an integrated project procurement team will be assembled consisting of the following main personnel:

- Project procurement manager;
- Material manager;
- Purchasing supervisor;
- Buyers—home office and field;
- Project expediting supervisor;
- Expeditors—home office and shop (area expeditors);
- Project supplier quality supervisor and shop (inspectors);

- Traffic and logistics supervisor;
- Procurement automation specialist; and
- Project field procurement manager.

The procurement organization will be located in Bechtel's home office and will be led by a full-time project procurement manager (PPM) who will report directly to the Bechtel project director. The PPM will be responsible for planning, organization, staffing and day-to-day management of all material-related activities. All procurement activities will be performed under the direction of the PPM.

The PPM will be responsible for planning, execution, developing goals and objectives, strategies, procedures and oversight of all assigned project and field procurement personnel. In coordination with the project procurement team, the PPM will be responsible for ensuring the development of specific project procedures, pro-forma documents, budgets, staffing plans, and management of the execution of the work. Furthermore, the PPM will facilitate interfaces with all departments and disciplines necessary to support procurement activities.

Other key elements of the procurement organization are as follows:

Purchasing

A full-time project purchasing supervisor (PPS) will be assigned to the project team, reporting directly to the PPM. The PPS will be responsible for purchasing equipment and materials as determined by the project execution plan. The PPS will ensure that sourcing plans, bidder list development, bidding, negotiation plans and negotiation, award and preparation of commitment documents are done in accordance with Bechtel practices and procedures as modified by specific job procedures. Purchasing will be performed by project buyers who will report to the PPS to formulate and administer the necessary purchase order agreements for equipment and materials.

Expediting

A full-time project expediting supervisor (PES) will be assigned to the project team, reporting directly to the PPM. The PES will be responsible for managing all expediting activities and resources, including supplier drawing and data submittals, material procurement and fabrication through shipment of the materials and equipment from the supplier's facilities to either its final destination or a materials consolidation location.

Expediting of major equipment and materials will be performed by expediting personnel assigned to the project procurement team under the direction of the PES. Expediting will be based on the principle of preventative expediting. Under this principle, no step in the engineering or manufacturing cycle is unimportant. All supplier engineering, procurement and fabrication activities will be closely monitored to ensure key events occur on schedule and potential problems are resolved before they become serious enough to impact schedules. The PES will develop a detailed expediting plan for all required materials and equipment, including those specific items and commodities that will require area expediting.

Area expediting, when required, will be performed by personnel from Bechtel's Global Supply Group (GSG) in the United States and agency personnel elsewhere in the world. The PES will be responsible for determining when area expediting is required and for issuing the necessary assignments to the appropriate personnel, monitoring their activities and reporting status back to the project team.

Supplier Quality

A full-time project supplier quality supervisor (PSQS) will be assigned to the project procurement team reporting directly to the PPM. The PSQS will be responsible for managing all supplier quality activities including preparation of supplier quality surveillance plans for specific material requisitions; issuing assignments for shop inspection; receiving, reviewing and distributing inspection reports; resolving questions and quality concerns; resolving supplier deviation disposition requests (SDDRs); and ensuring that materials and equipment have sufficient inspection to ensure conformance to purchase order quality requirements prior to shipment from the supplier's facility(s). The PSQS will also be responsible for keeping the project team informed about quality concerns or problems on an ongoing basis throughout the project.

All supplier material procurement and fabrication activities will be closely monitored to ensure the required level of quality is achieved and potential problems are resolved before they become serious enough to impact schedules or cost. The PSQS will develop a detailed supplier quality plan for all materials and equipment identifying the levels of inspection required, if any.

The PSQS, in conjunction with engineering, will be responsible for determining when shop inspection is required and for issuing the necessary assignments to the appropriate personnel, monitoring their activities and reporting status back to the project team.

2.3.1.4.a.ii TRAFFIC AND LOGISTICS

A full-time project traffic and logistics supervisor (PT&LS) will be assigned to the project procurement team reporting directly to the PPM. The PT&LS will be responsible for managing all traffic and logistics activities, including logistics surveys and planning, supplier shipping arrangements, establishment of export packer, freight forwarder and customs broker agreements, establishment of consolidation warehouses and all necessary shipping arrangements to ensure safe, low-cost and timely delivery of all materials and equipment at job site locations without loss or damage. The PT&LS will also be responsible for keeping the project team informed about the status of all shipments on an ongoing basis throughout the project.

LOGISTICS PLAN

Mainline pipe will be shipped by ocean vessel to Alaska for delivery to six pipe yards north of (and including) Fairbanks for spreads 1, 2 and 3, and to three pipe yards between Fairbanks and Valdez for spreads 4 and 5. It is anticipated that there will be approximately 71,000 60-foot by 48-inch joints (no double joints) shipped from the various mills. Planning is based on the pipe being internally and externally coated, including mechanical protection coating, at the mill prior to shipment.

The primary plan is that mainline pipe will ship to the ports in Seward and Valdez, Alaska. Pipe destined for spreads 1, 2 and 3 will be discharged in Seward directly onto rail cars for shipment to Fairbanks, Alaska and will be shipped from the railhead to the pipe yards by truck.

Mainline pipe scheduled for spreads 4 and 5 will ship to the port in Valdez, Alaska. Discharge would be made directly to trucks for shipment to the pipe yards.

Insurance

Marine cargo insurance will be carried by Owner and shipments will be made in accordance with the provisions set forth in the policy.

General Cargo

General cargo will be delivered and consolidated in Seattle, Washington. In the early stages of construction, when shipment volumes are low, a liner barge service will be used that originates in Seattle and ships to Valdez. Shipments will be made in shipper owned containers when possible and discharged onto trucks in Valdez for final shipment to the gas conditioning plant on the North Slope. These containers will be stripped at their delivery site(s) and returned to Seattle to be recycled in the transportation plan.

2.3.1.4.b LNG PLANT

2.3.1.4.b.i PROCUREMENT

Procurement will perform purchasing, expediting, supplier quality, material management, traffic and logistics, procurement automation, field procurement for the Alaska Infrastructure Project LNG plant. The structure of the team and the division of responsibility will be similar to that for the pipeline as outlined previously

2.3.1.4.b.ii TRAFFIC AND LOGISTICS

A full-time project traffic and logistics supervisor (PT&LS) will be assigned to the project procurement team reporting directly to the PPM. The PT&LS will be responsible for managing all traffic and logistics activities including logistics surveys and planning, supplier shipping arrangements, establishment of export packer, freight forwarder and customs broker agreements, establishment of consolidation warehouses and all necessary shipping arrangements to ensure safe, low-cost and timely delivery of all materials and equipment at job site locations without loss or damage. The PT&LS will also be responsible for keeping the project team informed about the status of all shipments on an ongoing basis throughout the project.

General

Traffic and logistics (T&L) personnel have the responsibility for providing logistical planning as well as efficient and economical transportation services. T&L controls the flow of material and makes all necessary shipping arrangements to provide cost effective and timely delivery at jobsite locations without loss or damage.

T&L has a defined budget based on expected transportation cost per MR. Should there be any scope changes, the appropriate trends will be developed to allow for these scope changes.

Through coordination with the project team, documentation necessary for trouble-free transportation across international borders and customs clearance will be identified before the material leaves the vendor's factory to ensure all documents are available in a timely manner.

Transport Safety

T&Lwill ensure that all appropriate load-out, fastening and transportation analysis and design are carried out for the stowage and securing the equipment in support of marine surveys for major and/or critical equipment.

Transport Cost Evaluations

T&L will participate in the evaluation of vendors' quotations regarding costs for packing and transportation. After award, T&L will work closely with the expediting supervisor to coordinate critical shipments.

Project Purchase Terms

Equipment and materials sourced outside North America will be placed FOB named port of export, export packed basis.

Where applicable, we request the international suppliers to provide pricing both basis FOB named port of exit and basis FCA Bechtel marshalling yard so that we take full advantage of the marshalling strategy.

All purchases are made basis INCOTERMS 2000.

T&L Organization

The T&L organization will be positioned at key office and marshaling locations in order to effectively manage the supply chain. We anticipate major marshaling in Korea and the U.S. West Coast. These may be changed depending on the project purchasing strategy.

Consolidation and Heavy-lift Transport

Project T&L will use the purchasing execution to determine the most efficient consolidation/marshaling points for the project. When the construction schedule permits, T&L will use consolidation to lower overall freight costs.

Heavy lifts will be identified and reviewed for combining heavy lift shipments. Construction Department rigging requirements, spreader bars fabrication, and critical handling requirements will be discussed and understood by all involved parties and agreed to.

International Transport Logistics

Selection of shipping companies will be in accordance with Bechtel standard selection process for T&L services providers. Agreements will be awarded for freight forwarding, marshalling yards, ocean transport, and customs clearance requirements to support the project, all of which will be electronically linked.

T&L will issue several formal instructions in connection with the shipment of project materials and equipment. The principal instructions are named below:

1. Project Packing Specification (PO Section 7) covers the essential instructions for proper preparation and packaging of materials and equipment.
2. Shipping Instructions (PO Section 7) cover the necessary procedures for the timely and proper preparation for shipment of materials to Alaska.

Insurance

Marine cargo insurance will be carried by Owner and shipments will be made in accordance with the provisions set forth in the policy.

Marine Surveyor

As a part of the marine cargo insurance policy, the underwriter will deploy a marine surveyor to witness the loading, stowage, and securing of each ocean shipment. This marine surveyor will be on-site to protect the interests of the underwriter and will witness the loading and discharge of the cargo and comment on any discrepancies observed.

Bechtel will also employ a marine surveyor to supervise the loading and discharge of the modules. This surveyor will coordinate with the barge operator, the heavy hauler, the longshoremen and all others involved in the movement and loading/discharge of the modules.

2.3.1.5 CONSTRUCTION EXECUTION

During the FEED phase of the project, the construction management team will further develop and enhance the Construction Execution Plan (CEP) and associated deliverables. Listed below is an outline of what will be achieved during this period.

Construction Execution Strategies

Detailed construction execution strategies will be developed for the gas pipeline from Prudhoe Bay to Valdez, including compression, and the LNG plants and facilities in Valdez

Labor Relations

The Alaska construction trades enjoyed another good construction season during the summer of 2007. Construction employment continues at a good pace, although work hours will now shift in to winter mode with industrial work on the North Slope increasing and work in the interior decreasing. The supply of some trades is ample for this time of year, and others are at full employment. Forecasts for construction in the state indicate that the supply and demand for skilled construction workers will remain constant for the next several years. Initial estimates of the number of construction workers for the project are that the labor requirements for the project will exhaust the available Alaska resources.

To support a project of this magnitude, Bechtel will implement a comprehensive labor relations program, including construction training programs, recruitment of Alaskan residents, skills enhancement and full

support of the existing craft apprenticeship programs. Bechtel anticipates that a project labor agreement (PLA) with organized labor will be an integral part of an overall labor management plan and strategy. Key to this program will be the establishment of competitive wage rates, fringe benefits, and working conditions to attract qualified personnel. Bechtel will also assign a full-time labor relations manager and staff to implement and administer the labor management program and PLA. Labor relations representatives will be deployed throughout the project as required.

During the next phase of this project, a detailed construction craft labor resources study will be undertaken to analyze the impacts of this project on labor organizations within Alaska and throughout the Pacific Northwest.

2.3.1.5.a PIPELINE CONSTRUCTION EXECUTION PLAN

Planned Pipeline Construction Spreads

Bechtel reviewed the construction parameters, including seasonal summer and winter construction time zones, and determined the project required five individual construction spreads. Four of the spreads range from 160 to 180 miles each, and the fifth spread consists of just over 100 miles due to mountainous terrain.

The construction spread layout extends from the most northerly location at Prudhoe Bay on the North Slope south to Anderson Bay, where the proposed LNG Plant will be constructed. Proposed pipeline spread lengths are as follows:

Spread No.	From MP - To MP	LENGTH, MILES
1	0 – 180.0	180.0
2	180.0 - 353.5	173.5
3	353.5 - 540.0	186.5
4	540.0 - 699.0	159.0
5	699.0 - 806.2	107.2

To evaluate the construction cost for a buried chilled gas pipeline, Bechtel projected a route generally parallel to and a minimum of 200 feet from the existing Trans-Alaska Pipeline System (TAPS) crude oil pipeline being operated by Alyeska Pipeline Service Company. The TAPS pipeline traverses a route from Prudhoe Bay to an oil terminal and loading facilities at the Port of Valdez. The chilled gas pipeline route alignment was located using aerial photography drawings outlined in the Alyeska Pipeline Service Company Oil Spill Contingency Plans, Environmental Atlas of the Trans Alaska Pipeline System, and the TAPS G-100 series Construction Record Drawings (as-builts). Route selection primarily considered terrain type, drainage structures, buoyancy control, waterway crossings, and environmental restrictions along with existing operational facilities for the TAPS route.

One of the major objectives was to establish a realistic construction schedule while considering the available construction seasons and potential logistic problems, and minimizing potential adverse impacts to Alaska's natural resources. In an effort to accelerate construction and expedite permitting of the project, it may be beneficial to re-establish as many of the original TAPS construction sites as possible. These sites include borrow pits, airstrips, camp sites and infrastructure road systems. This will be further demonstrated in the spread-specific documentation.

In order to establish a construction cost estimate, Bechtel uses a proprietary computer program called Crew Cut. This computer software is used to detail the labor and equipment required for each specific crew performing a major work activity associated with the construction of the pipeline and its operational

facilities. Each Crew Cut operational sheet denotes the necessary equipment, personnel, support materials, tools, consumables and construction duration to complete an individual activity. Crew Cut is also used to establish subcontracting activities and/or support crews, such as camp operations, air support, office engineering, surveying, geologic data gathering and environmental monitoring.

Planned Construction Campsites and Locations

Construction camp housing will be utilized for the pipeline, compressor stations and LNG plant construction workforce of more than 10,000 during the peak-load periods. Pipeline construction requires 12 each construction campsites, 11 of which TAPS previously occupied during the construction of the oil line. One new site will be located around the Fairbanks Township, possibly on leased military properties. The gas compression facilities located in the Prudhoe Bay area and the LNG facilities located in the Anderson Bay area will also require construction camps. These camps are larger than the planned pipeline camps. It is estimated the campsite at the LNG facility will have a housing requirement of more than 3,500 personnel. Original TAPS sites were selected to reduce cost for preparation of new campsites and to ease project permitting for construction. It is assumed the original campsites can be easily upgraded (re-surfaced with gravel) and permitted with minimal additional environmental impacts.

Pipeline construction camp sizes will vary depending on workforce requirements and duration. There are two compressor stations planned for construction simultaneously with the pipeline installation. At these locations, workforces for the pipeline contractor and compressor station will share a common campsite to reduce construction and operational cost. Shared sites will be Coldfoot Camp at Milepost 236, located within Spread 2 for Compressor Site Number 3, and Delta Camp at Milepost 532, located within Spread 3 for Compressor Site Number 5. The following list details proposed campsites, location and size of facilities:

Pipeline Spread	Camp Name	Mile Post	Size (Man)
1	Franklin Bluffs	43	600
	Happy Valley	81	600
	Galbraith Lake	119	700
2	Dietrich	201	650
	Coldfoot	236	1100
	Old Man	301	600
3	Livengood	394	750
	Fairbanks	451	850
	Delta	532	1100
4	Isabel	600	900
	Sourdough	654	650
5	Tonsina	731	1100

An additional factor in determining the selection of the construction campsites was the existing infrastructure (at some of the campsites) i.e. access roads into camps, airstrips, helicopter pads and disposal sites. Costs for new camps, upgrading campsites and their facilities have been incorporated into the project cost estimate.

Project Schedules and Construction Planning and Logistics

Due to the remoteness and harsh winter environment within the interior of Alaska, coupled with the lack of construction support infrastructure, extensive planning and forethought will be required prior to the commencement of actual project construction. Extensive preparation and construction of various facilities will be necessary prior to any mainline pipe or compressor station installation. As an example, demarcation and protection for the existing TAPS facilities will be required in locations where the proposed gas pipeline encroaches upon or crosses the TAPS right-of-way (ROW). Extensive planning and procedural implementation will be required to assure protection of the TAPS system during construction efforts. The following activities will require careful considerations and planning to enable direct work for the pipeline and compressor stations to begin:

- Procurement/Movement of permanent and construction materials;
- Mobilization and Arctic preparation of construction equipment;
- Procurement/Establishment/Operations of temporary living facilities/field offices;
- Procurement/Establishment/Operations of maintenance facilities;
- Mobilization of craft and staff personnel; and
- Geotechnical/Hydrologic/Environmental/Construction engineering including survey data-gathering.

The project schedules encompass an approximately eight-year-and-nine-month work plan inclusive of environmental and construction permitting, pre-construction activities (as described above), pipeline and compressor station installations, installation of gas compression and LNG facilities, testing, commissioning of facilities, final clean-up and restoration. The project schedule reflects the execution plan optimization of weather seasons and work duration using conventional pipeline construction. In addition, full advantage is taken where the implementation of modern construction techniques and methodology help create smaller construction crews, resulting in decreased overall project costs.

Due to the magnitude of this project and the need for simultaneous construction of five pipeline spreads, compressor/scraper trap stations, gas compression and LNG facilities, the majority of construction equipment, temporary facilities, and construction camps will be mobilized from outside the State of Alaska. The current plan is based on the use of Seward, Whittier, Valdez and Anchorage as the ports of entry. These ports will be primarily used for project materials such as pipe, compressor station / scraper trap equipment, camps, construction equipment and consumables. It will be necessary to coordinate movement and shipping of all subcontractor equipment and material from the lower 48 states to the Alaskan port of entry, and finally, to each respective pipeline spread base camp and vice versa. This is to assure that scheduling of all equipment and material shipments is timely executed on a global project basis by procurement and traffic logistics.

Construction Assumptions

The chilled gas pipeline will be totally buried, with construction parallel to, and in most cases, no closer than, 200 feet off the existing TAPS alignment. The TAPS as-built drawings (G-100s) were used to determine soil conditions, terrain and assumptions made were priced as part of the construction requirements. Due to the lack of survey and geological data to determine actual soil conditions along the proposed pipeline route, for planning and estimating purposes construction methodologies were determined as noted below. Engineering observations noted from the G-100 drawings were used to determine soil conditions near the proposed gas pipeline route as described in the following:

- In locations where the TAPS pipeline was built above grade, i.e., elevated mode on vertical support members (VSMs), the soil conditions were considered thaw unstable (frozen permafrost with ice rich soils), requiring the installation of a gravel workpad for new construction. This workpad will allow protection to ground surface terrain during the installation and construction of the gas pipeline. Data taken from the G-100 drawings indicates approximately 426 miles of the TAPS pipeline is built above grade.
- Where the TAPS pipeline is below-ground construction, the soils were assumed to be thaw stable and generally required no gravel workpad. In most of these locations, conventional

pipeline ROW grading (preparation) will be acceptable in supporting heavy equipment and pipe installation during construction efforts. Data from the G-100 drawings indicates approximately 372 miles of the TAPS pipeline is buried.

Roadways and Supporting Access Roads

Two existing major roadway systems are parallel and within close proximity of the proposed gas pipeline routing. These systems are identified as the Dalton Highway (north of Fairbanks) and the Richardson Highway (south of Fairbanks). Both networks of roads will be used for the majority of all equipment movement and material transport support needed during construction of the pipeline. From these existing road networks, there are 135 gravel access roads (APL) which were built for access to the TAPS pipeline and its facilities. This road system is identified and outlined in the Alyeska Pipeline Service Company "Environmental Atlas of the Trans Alaska Pipeline System" and the G-100 series of drawings. It has been assumed that this same road system will be used for support for construction of the new gas pipeline. In addition, the estimate has included the design and building of an additional 50 miles of access roads into the new gas pipeline route from both major highway networks.

Gravel Materials Sites

Alyeska G-100 drawings identified 62 active operation material sites (OMS) as existing borrow pits (material sites). These pits are assumed to be available for material extraction. It was assumed that not all of the project required gravel could be taken from the existing sites, so to circumvent the shortage, costs for permitting and developing a minimum of 30 additional material sites has been included in this estimate.

Pipe Stockpile Operation

The purchase of more than 71,000 48-inch diameter, 60-foot long pipe joints will most likely be from Pacific Rim pipe manufacturers due to capability and proximity to the project. It was assumed that all pipe will be shipped to Seward and Valdez, Alaska. Approximately 600 miles (53,000 joints) of the pipe will be off loaded and railed to Fairbanks, Alaska and approximately 200 miles (21,000 joints) of the pipe will be off loaded at the Port of Valdez. All pipe will come coated from the pipe mills with an external and an inner thin-film coating.

Once offloaded and placed in temporary stockpile locations near the ports of entry, the pipe will be moved to various designated stockpile sites within each construction spread. A subcontractor will be responsible for pipe transport to the designated stockpile sites. Assuming two 48-inch, 60-foot pipe joints on each truck, more than 23,000 truckloads of pipe will need to be coordinated and moved over the Alaska Highway systems (leaving more than 24,000 joints to be staged at Fairbanks and Valdez for later stringing by the contractors). Some scheduling of pipe loads will be required to meet Alaska Highway requirements especially during foul weather conditions and in accordance with spring thaw restrictions.

In planning pipe movement and stockpiling, Bechtel has selected all applicable previous construction campsites/pipe yards used for TAPS construction as logistical locations. It is believed that some of these sites exist as gravel padded areas and can be converted to pipe storage yards fairly easily. Also these sites can be re-permitted for construction use with relative ease versus virgin territory. There are 10 pipe storage locations proposed; seven are at previous TAPS campsites/pipe yards, one site in the Fairbanks area (pipe yard), one site in the Valdez area (pipe and storage area) and one at an existing TAPS material site. The material site pipe storage location is identified as OMS 38–1R Milepost 586 on the TAPS system. Pipe storage stockpile sites are proposed as follows:

Pipe Stockpile Sites	Location
Franklin Bluff Camp Site	MP 43
Happy Valley Camp Site	MP 81
Galbraith Lake Camp Site	MP 140

Atigun Pass Camp Site	MP 163
Prospect Camp Site	MP 275
Fairbanks Pipe Yard	MP 451
OMS 38-1R Material Site	MP 586
Glennallen Camp Site	MP 682
Sheep Creek Camp Site	MP 778
Valdez Pipe Yard	MP 800

Allowances for site development and maintenance for these material storage sites are included in the estimate along with subcontract pricing for pipe transport, hauling, handling and stockpiling.

Stringing and Bending

After all pipe has been placed in the stockpile sites, the pipeline contractors will then load and truck the pipe from the site and string along the ROW per the project drawings and approved stringing list. The pipe will be unloaded from the stringing trucks with a pipelayer and placed on skids or sandbags to keep the pipe off the ground. The bending engineer and bending crew will follow the stringing operation. The bending engineer will survey the ground profile along the trench line and mark the pipe with applicable overbends, sags and side bends. The bending crew will then pick up each piece of pipe that is marked for bending. The joint of pipe will be placed in the bending machine and bent according to the bending engineer's instruction, then place back on the ROW.

It should be noted that there are a limited number of fabricators that can successfully build a bending machine to handle 48-inch pipe with wall thicknesses of 0.925-inch and greater. Based on current surveys, there are a few existing machines worldwide that can bend this grade and thickness of pipe. The cost for construction of new bending machines will be expensive. Manufacturers indicate that modifications are required for existing bending machines, and construction of additional machines may be necessary. Also, manufacturing time will be several months minimum per unit. Present pipeline contractors do not have this type of heavy equipment in their inventory. This will require the successful bidding pipeline construction contractor to order this equipment prior to award of the contract in order to meet construction schedules. The cost and manufacturing of these units may have to be sponsored by the project and not the individual pipeline contractors – this has been included in the pipeline cost estimate. It is proposed to limit the degree of bending required by careful route selection and grading, in order to minimize the requirement for induction bends for sharp changes in direction.

CROSSINGS

Stream and River Crossings

Drawings indicate several hundered waterways of various sizes and types to be crossed during construction of the new gas pipeline. Many crossings are environmentally sensitive and are classified as fish migration zones, spawning, rearing and/or overwintering areas. Special construction techniques will be required and/or restricted construction windows will apply to these crossings. The majority of streams will be "open-cut" (conventional) construction during the winter months when the stream is in a frozen state. This should minimize, if not eliminate, the environmental impact to the water body. It is assumed that several of the major crossings and some of the sensitive fishery streams will be constructed using horizontal directional drilling (HDD) or microtunneling processes. This estimate includes a total of 23 HDD crossings and 19 microtunnels. All pipe used for HDD or microtunneling will have an abrasion-resistant coating. Once detailed engineering is complete, some of the potential HDD sites could be converted to microtunneling for construction convenience or to lower the installation cost. Other special construction sites have been considered as potential tunneling operations and will be finalized during the detailed engineering stages. Key potential locations include Atigun Pass, Thompson Pass, and Keystone Canyon. There is also the potential to utilize microtunneling in certain sidehill zones where conventional

construction techniques such as benching may not be acceptable due to environmental considerations. The implementation of these techniques will be based on geotechnical data.

In water crossings where ice damming could be a potential problem, the pipe will be initially coated with three to six inches of polyurethane foam, and then jacketed with either metal or polyethylene to insure the insulation is waterproof. This will sufficiently insulate the chilled pipeline, while not allowing the subfreezing temperatures to migrate to the surrounding water where freezing can be induced and promote ice damming, which could result in lack of flow or redirection of the stream bed.

Road, Highway and Railroad Crossings

It is assumed that all roads, highways and railroad crossings will require an approved state permit prior to construction. Unpaved and low-traffic minor road crossings will be requested to be crossed using a conventional "open-cut" method. For major roads, highways and railroads, it is proposed to use slick boring or microtunneling without installing a casing pipe. Casing pipe will only be used if absolutely required by an agency or ground conditions.

Trenching Operations

After review of the aerial photography (G-100 drawings) and known profile/geology data, it has been determined that approximately 495 miles of the 806-mile pipeline route can be excavated using heavy-duty chain-type trenchers. Bechtel selected the Trencor 1860 trencher based on its past track record for excavation in rocky terrain similar to the hardest of permafrost soils. Permafrost soils range in compression strengths of 8,000 to 10,000 psi. Based on present construction schedules, it appears that nine new trenchers with the digging capability of the Trencor 1860 will be required. The cost of new trenchers and operational teeth has been included in the Crew Cut program.

The cost for construction of a new, large, chain-type trencher is more than $2.5 million per unit. Manufacturing time is approximately four months for assembly of one unit. Present pipeline contractors do not have this type of heavy equipment in their inventory. This will require the successful bidding pipeline construction contractor to order equipment prior to award of the contract in order to meet construction schedules. If the trench excavation using any type of heavy-duty chain trenchers is ultimately chosen for the project, the cost and manufacturing of these units may have to be sponsored by the project and not the individual pipeline contractor.

The remaining 311 miles of proposed pipeline route is either too steep in slope dimensions or has rock compressive strengths that would deem the 1860 trenchers unproductive. The majority of the 311 miles is located along various mountain ranges that the pipeline traverses. Due to the roughness and steep grades in these areas, it has been assumed that a minimum of 200 miles of ROW construction will require explosives for leveling the grade. Within these 311 miles, it is also estimated that 120 miles of this alignment will be hard rock trench construction. Trench excavation through these 120 miles will require explosives. This will be accomplished by conventional drill and shoot methods with the trench line excavated using hydraulic backhoes after blasting. It is assumed the remaining 191 miles of pipeline trench in rocky soils will be trenched using typical pipeline hydraulic backhoe equipment.

Pipe Welding and Non-Destructive Testing

Pipe design based on operating pressures and corrosion factors, requires a pipe classification of API 5L, Gr X-80, with a wall thickness ranging from .925 to 1.332 inches. In order to weld 48-inch pipe strengths of 80,000 SMYS and wall thickness referenced above with any consistency, Bechtel estimated that the pipeline welding for this project will be done using a mechanized field welding process. The CRC-Evans mechanized welding system is proposed. This system employs an internal root pass in conjunction with the external passes deposited into a narrow gap or "J" bevel. The external passes are applied using mechanized welding machines. The normal process is gas metal arc welding (GMAW), using Ar/CO_2 shielding gas mixtures for the root and cap passes and 100 percent CO_2 shielding gas for the hot and fill passes. Only a few pipeline construction contractors have equipment spreads available to weld 48-inch pipe automatically. To achieve mechanized welding on the project and to assure proper equipment is available for all five construction spreads simultaneously, Bechtel believes that the project must sponsor equipment ordering and compensate pipeline contractors for developing this system.

Tie-in welding will be performed with a semi-automatic system (same GMAW system as mentioned above), except the root bead and first hot pass will be done manually using a shielded metal arc welding (SMAW). Welding will be performed with the same welders, but qualified using both systems together.

Welding for compressor station piping and mainline valve fabrication will be completed using the welding process for SMAW and the semi-automatic system GMAW. The different systems will be used based on the pipe wall thickness and diameter.

All project welding will require preheating due to material grades along with the existing cold climate conditions. Bechtel plans the use of electric induction heating pad systems in conjunction with regular welding equipment. This equipment has the flexibility while being user-friendly to give construction the best welding support and performance.

The use of an automated ultrasonic weld inspection system (UT) is planned for all pipeline welding, including mainline, tie-in welds and fabrication where applicable. This system is computerized and provides a permanent electronic file for as-built documentation. Where pipe diameters will not allow UT examination, the conventional radiographic inspection will be performed (compressor station and pipe fabrication).

Listed below are items included in the project estimate associated with the rental of specialized (mechanized) welding equipment:

- The conversion/modification of contractors equipment for installation of an automatic welding system;
- The installation of induction heating equipment;
- Spare parts and consumables for mechanized welding; and
- Training and qualifications of welders and welding procedures.

For UT and radiographic inspection, all costs for equipment, consumables and technicians have been incorporated into the cost estimate.

Bechtel's in-house weld tracking program will be used in conjunction with mainline welding. This program lists each weld by actual number in sequence, based on as-built pipeline stationing. The pipe joint serial numbers on each side of the weld and respective joint length are referenced as well as bends, wall thickness changes, coating type, the deposition of the weld, i.e., if it has passed inspection, was repaired, cut out, re-x-rayed and which report number depicts the acceptance of the weld. The information from this database is used as a check against the as-built survey regarding length, bends, pipe wall thickness changes, etc.

Fabrication welds for compressor/scraper trap stations and valve sites are tracked using the designated table on the respective as-built isometric drawing.

Buoyancy Control

There is currently a total of 60 miles of buoyancy control included in the estimate. The majority of the buoyancy control is required in the flood plain areas. Buoyancy control will be in the form of either continuous concrete coating or set-on weights and apply a minimum 10 pounds per foot negative buoyancy to the pipe.

Field Joint Preparation

The pipeline construction contractors will perform the field joint coating after completion and acceptance of the girth welds. The girth welds will be coated using a project approved method such as sandblasting, induction heating of the joint and application of FBE or three-layer compatible coating through the use of an oscillating powder ring or other applicable process that will be compatible with the mainline external coating. Coated joints will be protected with an armor coating such as rock shield, which is a sheet-applied application prior to lowering the pipeline into the trench. All costs for coating materials, coating equipment and labor have been included in the cost estimate.

Lowering In and Backfill/Cleanup Operations

Project construction schedules depict trenching, lowering–in, initial backfill and clean-up operations—in most cases, completed during the winter construction seasons. This work is planned for winter construction to alleviate the possibility of thawing and to minimize environmental impact to the permafrost and ice rich soils. Each construction spread has some designated thaw stable soils which will allow normal pipeline construction sequencing. In these cases, the pipeline will be buried and backfilled by conventional methods.

Winter construction of lowering-in and backfill will be performed in a similar manner as normal pipeline construction, except the pipeline will have to be carried across the ROW. The welding of the pipeline in the summer season will position pipe strings to the opposite side of the workpad from the trench (noted as the working side). This is necessary to allow adequate room for the large trenchers to operate through the area. This positioning of the pipe will require the welded strings to be cradled across the ROW after the trench has been excavated. Due to the sensitivity of permafrost soils exposure for long durations to atmospheric conditions, lowering-in activities will be closely synchronized with the opening of the trench. Laying pipe to the working side of the ROW creates additional tie-in welds as the strings of pipe will be laid in shorter sections (estimated 1,500- to 2,000-foot sections, depending on the terrain). These shorter sections will allow cradling the pipe string across the ROW adjacent to the trench. The lowering-in crew will work closely with tie-in crews coordinating as many tie-in welds that can be completed outside the trench prior to actual lowering-in. After the pipe is lowered into the trench, the section will be backfilled except for a minimum of 200 to 300 feet on each end. The ends of each section will be left uncovered in order for the pipe to be maneuvered to make the line-up for the tie-in weld.

For areas of the pipeline laid in significantly sloped terrain, ditch breakers or trench breakers will be installed at designated spacings per project specifications. These breakers, in conjunction with water bars or diversion levees, will minimize any problems that may occur with regard to drainage on or across the ROW. These mitigation measures will alleviate the possibility of removing the cover from over the pipe and exposing or floating the pipe out of the trench. These breakers could be manufactured with open-cell polyurethane foam or with sandbags.

Excavation of the trench will be achieved using two methods; either chain type trenchers or conventional drill/shoot with hydraulic backhoes for excavation. Trench spoil will be utilized as the padding and initial backfilling of the pipe. For this reason, it is planned to have an abrasion resistant coating on the pipe that will allow direct placement of trench spoils onto the lowered-in pipe with minimal preparation.

Trench spoil that has been excavated after blasting will require careful placement to protect the pipe and coating from being damaged. Where blasting has occurred, the contractor will be required to carefully select backfill materials from the trench spoils. Backhoes working the trench spoil will select smaller fine materials for the initial padding and placement on the pipe. Once the pipeline is covered with adequate select spoil, the remaining trench spoil will be placed in the trench with backhoes and dozers. All excess trench spoil will be bermed over the center of the pipeline to allow for future settlement. Where applicable, additional spoil material will be distributed across the ROW or hauled and disposed of at appropriate disposal sites. The major objective for winter trenching, lowering–in and backfilling the pipeline simultaneously is to allow the trench to be open and backfilled under frozen conditions. Working during frozen conditions will eliminate long-term permafrost degradation, resulting in minimized environmental impact.

Compressor Station Construction

The proposed scope includes the requirements to install a 48/42-inch pipeline from Prudhoe Bay to Anderson Bay with compressor stations to move the gas flow as designed. Since the pipeline route has not been finalized the compressor station locations have been strategically located based on the hydraulic flows for the first phase of the project. When demands for higher gas flow volumes (phase II) are required an additional three compressor stations will be constructed. The present design proposes compressor station locations as follows:

- Compressor Site # 1 – Mp. 100(future site to be constructed during Phase II). Scraper trap facilities will be constructed during Phase I
- Compressor Site # 2 – Mp. 203 (future site to be constructed during Phase II). Scraper trap facilities will be constructed during Phase I
- Compressor Site # 3 – Mp. 320 to be constructed during Phase I construction
- Compressor Site # 4 – Mp. 439 (future site to be constructed during Phase II). Scraper trap facilities will be constructed during Phase I
- Compressor Site # 5 – Mp. 550 to be constructed during Phase I construction
- Compressor Site # 6 – Mp. 683 (future site to be constructed during Phase II). Scraper trap facilities will be constructed during Phase I

Compressor Station No. 3 at Milepost 320 and Compressor Station No. 5 at Milepost 550 (near pipeline) will be constructed as part of the Phase I program. With both of these sites being in relatively close proximity to construction camps, it is planned for both the pipeline and station work forces to share the same camp facilities.

A typical compressor station site will encompass approximately 40 acres of land allowing sufficient space for expansion and operational maintenance of facilities during winter months. Not knowing the exact soil and terrain condition for each of the compressor sites, engineering has designed the compressor station site as a gravel land-filled area. The pipeline contractor for the applicable spread will prepare and install these gravel pad areas during the workpad construction operations.

The construction of the compressor stations is planned and outlined as a 30-month exercise to be completed with the end of pipeline construction. This timeframe allows commissioning and start up of the system.

CLEANING/GAUGING/TESTING/DRYING THE PIPELINE AND COMPRESSOR STATIONS

The pipeline system will consist of 806 miles of 48/42-inch X80 pipe designed for operation at 2,220 PSIG. The entire pipeline system, including appurtences and facilities, will be strength tested to pressures as required by the DOT Code as set out in CFR 49 Part 192, titled *"Transportation of Natural or Other Gas By Pipeline: Minimum Safety Standards."*

All pipeline sections installed will require cleaning, gauging, testing, de-watering (if applicable) and drying prior to final tie-ins and commissioning. Suitable cleaning scrapers (pigs) will be traversed through the pipeline sections using compressed air. At this time, a gauging plate may be run for an initial determination of the presence of dents, buckles, ovality or other anomalies. An electronic caliper pig will eventually be run through each section to verify the pipeline is free of all anomalies. The caliper pig survey will be run following the completion of strength-testing and dewatering (if required) prior to final pipe acceptance.

Strength-testing each pipeline segment will be performed using either a conventional hydrotest (water) or pneumatic (air) test.

Water Testing

Hydrostatic testing will require a total of 104 to 129 individual test segments, depending on the number and location of water sources that can be permitted for test purposes. Final determination of the number of test sections will be made after a definite route has been selected, terrain profiles completed and suitable water sources have been identified and approved for project use. Consideration of this information and class will be used to minimize the number of hydrotest sections required.

Test sections will be laid out based on a minimum test pressure of 90 percent specified minimum yield strength (SMYS) at the high point and 100 percent SMYS at the lowest elevation. Per the code, Class 1 and 2 location pipe sections will be tested to a minimum of 110 percent and 125 percent of MAOP, respectively. Class 3 locations including compressor stations and scraper trap facilities will be tested to a minimum of 150 percent of MAOP.

Pneumatic (Air) Testing

The use of dehydrated air as a test medium may be considered since it will not be necessary that ambient temperatures be above 32°F and will also assist in drying the pipeline test sections. Air-testing may require a minimum of 44 individual pipeline test segments compared to the potential 129 test sections using water. Test sections will be selected based on convenient length and site access. Elevation differences will be considered, but should not play a major role in selecting test section limits due to the difference of density for air and water.

Minimum air test pressure for Class 1 pipe sections will be 1.10 times the maximum allowable operating pressure (MAOP), with a maximum test pressure equivalent to the maximum hoop stress as 80 percent of SMYS. Minimum test pressure for a Class 2 section will be 1.25 times MAOP with a maximum test pressure equivalent to the maximum hoop stress as 75 percent of SMYS. Should a pneumatic testing program be incorporated, Class 3 sections will generally remain as hydrostatic tests, except when this is impracticable due to low temperatures and/or unavailability of hydrotest water, in accordance with current code requirements.

The cost estimate for air-testing is higher than conventional water-testing, but it has been determined the project could greatly benefit from a combination of the two methods. Although air-testing initially appears more expensive due to the cost of the numerous high-pressure air compressors that will be required, the overall cost may be less due to the potential problems associated with water-testing in cold climates. Water testing is restricted to calendar months when the ambient temperatures will be above freezing or with elaborate freeze protection schemes. The advantages for air-testing are that it can be performed year-round with little regard to temperatures, and that it will help dry the pipeline in the process.

Presently, the construction schedules for strength-testing the pipeline, appurtenances (mainline valves) and compressor/scraper trap stations is planned for hydrostatic testing (water). Since most of the pipeline will be laid during the winter construction season, water-testing for these facilities will not be performed until the following year's summer construction season. Measures will be developed to prevent deterioration during the intervening period. Permitting for withdrawal and discharge of water required for hydrotesting may eventually convert testing efforts to air.

Upon completion of hydrotesting and dewatering, the pipeline will be tied-in forming approximately 40- to 80-ile sections and dried to a final design dew-point temperature with dehydrated air. Construction costs have been estimated to include cleaning, water testing, drying and commissioning the pipeline, appurtenances and compressor station bypass piping.

Final ROW Clean-up and Restoration

During construction, the pipeline subcontractors will be responsible for preliminary clean-up efforts and preparation for final restoration. The actual pipeline construction seasons are divided into two distinct seasons denoted as summer and winter. Because more than half the pipeline construction will be conducted during the winter months, the final restoration work for these areas will be completed during the following summer construction season.

Pipeline installations that are completed during the summer months will also have final restoration completed that season. This will include the installation of erosion control structures, wildlife protection structures, replanting of native vegetation and visual impact structures (if required). All environmental issues will be addressed and the ROW will be restored as closely as practicable to its original condition.

The integrity of this work will be monitored during and after completion to assure its success for the project and the environment.

Pipeline installations occurring during winter months will have final restoration completed the following summer construction season. The backfill and cleanup efforts that are performed during pipe installation will be completed as much as practicable with the frozen terrain and harsh winter environment. Prior to winter installation of the pipeline, the ROW shall be prepared with the necessary temporary erosion control and wildlife protection structures. Contractors will be responsible to assure that the clean-up activities will not cause blockage or erosion problems during future spring thaws and run-off. Contractors will be responsible for completing the final restoration to these winter-constructed areas as soon as possible (during the spring break-up). This may require several crews working different locations simultaneously, with priority on the unstable soil conditions.

Contractors will be responsible for removing all temporary construction structures and complete final restoration requirements as soon as possible after the pipeline is installed, tested and commissioned. The formation of project schedules was designed to construct and monitor the success of the entire ROW restoration throughout construction seasons and into the last year for demobilization of the project.

As-Built Requirements

Upon completion of right-of-way clear and grade, the surveyors will retrace the route, setting the pipeline center line for the trench crew. Pipe diameters, pipe wall thickness changes, and breaks for hydrotest sections will be clearly marked for stringing crews. As the pipe is strung, a team of surveyors will transfer the pipe serial numbers from the inside of the pipe to the outside of the pipe for later use by the as-built survey team. This will not be necessary if there is an acceptable bar code system in place for recording the pipe data. The as-built survey date will be collected using a combination of global positioning satellites (GPS) and conventional electronic total station survey instruments. Pipe data will be initially obtained during mainline welding and correlated to the weld tracking database and automated ultrasonic testing (UT) results log. Horizontal and vertical survey controls using both methods will establish final pipe location prior to backfill.

Total stations control points will be set at intervals along the working side of the ROW. The instrument man will set the total station up at a nearby control point and radially record the data as the rodman sets up at each data point. The survey rodman will walk along or adjacent to the pipe with a rod and prism and set up on welds, bends, foreign crossings, coating changes, pipe wall thickness changes, cathodic protection test leads, natural grade and above ground physical features. At this time, the pipe serial numbers, weld numbers, degree of bends, and physical features will be recorded in the survey as-built notes which will serve as input for the as-built alignment sheets.

GPS surveyors will take readings with the GPS backpack unit, stopping at welds, bends, foreign crossings, coating changes, pipe wall thickness changes, cathodic protection test leads, natural grade and above ground physical features to record as-built data. Pipe serial numbers, weld numbers, degree of bends as well as physical features will be recorded in the survey as-built notes which will serve as input for the as-built alignment sheets

Pipeline engineering will work closely with QA/QC to ensure that all welds have been ultrasonically tested or radiographed, approved and accepted before the section of pipe is allowed to be lowered into the trench. As the pipe is lowered into the trench, the depth of cover will be recorded at least every 200 feet as well as at each sag, overbend and point of intersection (P.I.). The type of terrain in which the pipeline is buried will also be recorded. After sections of welded pipe have been lowered in the trench, the separate sections of pipe will be tied-in. The tie-in surveyors will record which joint of pipe was cut, as well as the length and check the tie-in weld stationing.

All survey information will be recorded as part of the as-built survey. Upon completion of the pipeline, the as-built survey information will be used to complete the as-built alignment sheets.

2.3.1.5.b LNG PLANT CONSTRUCTION EXECUTION PLAN

Introduction

The construction execution plan for the LNG Plants and Facilities is based on the grassroots construction/stick-built method on the jobsite. During the next phase of the project, we will evaluate the potential of modularizing specific components of the plant, but the current execution plan is based on stick-built in the field.

Bechtel has established itself as the global leader for engineering, procurement, and construction (EPC) of LNG plants, facilities, and import terminals. We will use the experience gained in several projects to develop a construction execution plan that is cost and schedule effective and provides for safe and reliable operations and maintenance.

Labor Relations

Forecasts for construction in the state indicate that the supply and demand for skilled construction workers will remain constant for the next several years. Initial estimates of the number of construction workers for the project are that the labor requirements for the project will exhaust the available Alaska resources.

To support a project of this magnitude, Bechtel will implement a comprehensive labor relations program including construction training programs, recruitment of individuals currently resident in Alaska, skills enhancement and full support of the existing craft apprenticeship programs. Bechtel anticipates that a project labor agreement (PLA) with organized labor will be an integral part of an overall labor management plan and strategy. Key to this program will be the establishment of competitive wage rates, fringe benefits, and working conditions to attract qualified personnel. Bechtel will also assign a full-time labor relations manager and staff to implement and administer the labor management program and PLA. Labor relations representatives will be deployed through out the project as required.

During the next phase of this project, a detailed construction craft labor resources study will be undertaken to analyze the impacts of this project on labor organizations within Alaska and throughout the Pacific Northwest.

Weather Window

Valdez is accessible by water year-round. Account has been taken of the high precipitation levels in the area, including the effects of significant snowfall in the winter.

LNG CONSTRUCTION EXECUTION OVERVIEW

Earthwork

The initial site investigation will consist of a geotechnical testing program to classify and quantify the soil and rock types. This will be the basis for formulating our cut-and-fill balancing program. A three-dimensional stratigraphy model will be assembled for the cut-and-fill strategy. It is anticipated that a substantial quantity of gravel/fill material will be required to complete the site development effort.

Concrete

During the second year of construction, our objective will be to cast all of the first train mass foundations in the summer months so that we can dress out the pedestals under winter hoardings. The compressor area and the east-to-west pipe rack will be areas of concentrated effort. These areas lend themselves to efficient winter hoardings that will stabilize our craft requirements and performance

Concrete will be provided from our on-site batch plants using transit mixer and concrete pumps and booms. Considerable extended work shifts will be required during the summer season to set the job up for successful winter work.

Structural Steel

One of the keys to the project is to assemble the structural steel on the main east-to-west pipe rack so that it enables piping to get off to an early start. The steel members will arrive early and be color-coded. We will use a pre-assembly yard to bolt up the bents in stacks. These bents will be rigged and set behind the concrete operation, creating competition for the concrete crews to stay ahead of the structural team.

The structural team will engage in an intensified effort to erect the compressor structural steel and siding before winter hits. These members will be color-coded and organized in the shakeout yard so that each column is laid down in chronological order of erection.

Architectural

Several of the electrical buildings lend themselves to prefabricated construction. We will design these buildings using footprints from our previous plants. They will arrive at the jobsite fully dried in and ready for heat, ventilation, and air conditioning units to be wired into temporary power. This will result in early starts for the electrical work, particularly on the compressor control, propane condenser control and main motor control rooms. Our rigging engineers will work with the design engineers to assure that the lifting lugs and foundation pedestals result in straight forward unloading and final setting. The manufacturer will ship the lifting bar along with the modular building so that it is available for lifting at the factory, barge, construction dock, and final location.

The remainder of the buildings will be stick-built on mass foundations. The warehouse will be constructed to store and protect all of the architectural pieces until the crews request the withdrawal of this material.

Mechanical

The mechanical equipment list will be used as the base document for organizing mechanical construction. Each piece has an assigned tag number, drawing number, purchase order number, shipping weight, erection drawings, and estimated time of arrival. The rigging superintendent and rigging engineer will work with the mechanical construction team to perform all of the required lifts.

Rigging cards will be used to organize the lifts into weight categories. Minimal formal planning will be used for lifts under 10 tons. Written calculations will be performed for lifts in the 25- to 50-ton range. For lifts over 50 tons, these calculations will be accompanied by scaled drawings. The rigging engineer will also support any lifts that use two cranes, a crane at more than 85 percent of capacity, or any lift deemed critical due to work constraints with scaled drawings.

Each rigging component will checked for its actual load versus its working capacity to assure that the shackles, slings, spreaders, hooks, line, boom, and stability are appropriate for the job. The rigging engineer will integrate the combined knowledge of the rigger, operator, supervisor, superintendents, and other engineers into the optimized plan.

Transportation drawings will be required for the cold-box modules and the equipment components that are over 50 tons. These will be accompanied by walk-downs to assure all obstacles are removed from the haul route well in advance of the arrival of our modules.

A periodic maintenance schedule will be formulated and executed to protect each piece of tagged equipment in accordance with the manufacture's recommendations and Bechtel's experience. A card will be attached to each piece showing the requirements along with the planned and actual date that periodic maintenance was performed.

Piping

The bulk piping program will originate in the east-to-west rack. Pipe rollers and double jointing techniques will be used to efficiently stuff the rack. The pipe fabrication shop will be used to double-joint, test, and touch-up paint the double joints. The pipe fabrication shop will also handle our small pipe requirements.

After the straight-run pipe is stuffed into the rack, our spool program will begin. Our procurement group will organize the arrival of the spools so that they are coordinated with construction. Each spool will have a color-coded tag labeled with its plant area so that the lay-down yard can be efficiently laid out and stocked for rapid withdrawal.

Our design team provides the field with a specific list of large bolted flanged connections. This list is used by our bolt-tensioning crew to provide precision tensioning with our specialized tooling program. The isometric drawings also provide material take-offs for each spool so that the crews can withdraw the specific gaskets and bolting for each connection.

Our piping program will be supported by dedicated welding engineers. These engineers will assist the supervision team with maintaining welder qualifications, reviewing preheating methods, and post-weld heat treating. The radiographic requirements will be met under the supervision of our lead welding engineer using our proprietary MAXTRAX welding software. The software system provides a simple and efficient means of weld mapping that has proven to result in consistently high-quality results for LNG work.

Electrical and Instrumentation

Our electrical design is based on minimizing the amount of underground cabling so that maintenance and trouble shooting are simplified during plant operation. The main underground duct bank from the control room to the main motor-control center is the majority of the underground work. The balance consists of minor circuits like perimeter lighting and security fiber-optics lines.

As the pipe-spooling program reaches its peak, the electrical cable tray program will get started. We will complete the majority of the cable tray before starting to pull any wire. The wire-pulling program will be organized using our SETROUTE proprietary program. The armored cable will be pulled using our air tuggers with pulleys and sheaves to avoid damaging the sheathing as creating back strains.

Painting and Insulation

Painting and insulation will be prioritized by area and system so that the installation sequence will support system turnover. Details of the painting and insulation plan will be worked during the next phase as we develop our system turnover sequence.

System Completion

As each train approaches approximately 75 percent complete, there will be a transition from bulk quantities to system completion. The construction site manager and project field superintendent will assess the timing of this carefully since switching the approach too soon or too late can interfere with the completion of the train.

When the team receives direction to switch to system completion, several activities will intensify. First, each field engineer and supervisor will review their quality assurance documents with their certification engineer to assure that their scope of testing documents is ready for turnover. Secondly, the disciplines will assemble their combined punch-lists and calculate their work-off rates to meet the completion dates. At this point, craft resources may be borrowed from bulk production to reach the more valued accomplishment of turning over a system.

The goal during system completion is to provide the start up team with a portion of the plant that has zero defects and all of the certification documentation to provide objective evidence of that status. This is the phase of the job where the areas will be polished into a walk-away finished product that is not only functionally correct, but demonstrates Bechtel's pride in craftsmanship and attention to detail.

Construction Management

The construction strategy for the LNG plant and facilities is based on a direct-hire approach by Bechtel. Specialty subcontractors will be employed whenever practical.

The construction organization will operate under the leadership of the construction site manager who reports to the overall project construction director. The construction site manager has overall responsibility for construction of the gas conditioning plant.

The construction site manager is responsible for control of construction costs, schedule, quality of the work, and the performance of contractor's staff, including subcontractors, working at Prudhoe Bay. They are the primary contact for client representatives in matters relating to the execution of construction work.

During the design phase, the construction site manager will be located in the project's engineering office to assist with qualification and selection of the module fabricators, constructability issues, and preparation of the optimum detailed EPC schedule, to finalize the construction execution plan, and to support development of the ES&H plan for the project.

The construction site manager will be assisted by the following key personnel in the management and supervision of all phases of the construction effort: project field engineer, project field superintendent, ES&H supervisor, labor relations supervisor, contracts manager and the field project controls manager.

The project field engineer is responsible for the supervision of discipline and area engineers, design interpretation, quality assurance and quality control, measurement and reporting of quantities installed for progress evaluation, specifying and requisitioning of field procured permanent plant materials, field welding program, mechanical completion and system handover. The project field engineer receives direction from the construction site manager.

The project field superintendent, under the direction of the construction site manager, is responsible for the field execution of the direct-hire portion of the project including detailed planning, quality, safety, hiring, disciplining and terminating craft personnel, tools and consumables, construction equipment, cost and productivity. He will be assisted in this role by discipline superintendents.

The ES&H supervisor reports directly to the construction site manager and has overall responsibility for establishing and implementing an organized accident prevention program, promoting and actively participating in a zero-accident philosophy, conducting ES&H orientations to acquaint employees with project conditions, safe work practices and procedures, and participating in safe behavior reinforcement. All safety, health, environmental, and security program(s) will be coordinated with the appropriate North Slope Borough personnel and existing operating company(s).

The labor relations (LR) supervisor reports to the construction site manager and has overall responsibility for recruiting, testing and hiring manual employees. The LR supervisor will establish and implement the project drug, alcohol, and firearm policies, establish site rules and regulations including standard drug and alcohol testing requirements, and develop a contingency plan for labor unrest.

The field project controls manager reports to the construction site manager and is responsible for field project controls and field accounting. Field Project Controls is responsible for the preparation of all schedules, estimates, labor analysis reports, material analysis reports, subcontract analysis report, trends, progress/performance reports, and project automation. Planning and scheduling are performed on a fully integrated EPC basis. Schedules to be utilized on this project include an overall milestone schedule, intermediate schedule, short-term look-ahead schedules and start-up schedules. Field accounting is responsible for payroll, cost and commitment reports, general ledger, monthly financial reports and all accounting functions including accounts payable. Accounts payable is responsible for setting up the vendor files, establishing and maintaining all purchase order files, matching invoices and receiving reports to proper purchase orders and preparing the invoices for payment.

To minimize personnel mobilized at Valdez, functions such as accounting, accounts payable, cost reporting and scheduling may be performed at another location.

The field materials manager is responsible for purchasing, expediting, vendor quality surveillance, receiving, warehousing and issuing project materials, including consumables. The project warehouse is supervised by field material management. They are responsible for material receiving reports, daily summaries and material withdrawal documentation.

TEMPORARY FACILITIES

Temporary Construction Buildings

Bechtel will erect a set of prefabricated modular buildings at the construction site. The majority of the buildings will be centrally located near the permanent plant warehouse. The main office, safety, environmental, warehouse, pipe fabrication shop, post-weld heat-treating shop, equipment maintenance and lubrication shops will all be located in this area adjacent to the worksite.

Outside of the main complex, we will erect field offices for supervision and engineering so that they will be as close as possible to their designated work areas and craftsmen. Change buildings, guard shelters, and an electronic badge alley will also be located beyond the main complex. Temporary shelters for painting and insulating craftsmen will be organized to minimize distance and travel time during the last phase of construction.

Temporary Access Road

During the first year of construction, an access road from the TAPS site to the LNG site will be constructed. It will be a gravel, all-weather road to enable the site to receive vehicles and reduce the risk and cost of marine operations.

A road maintenance supervisor will be dedicated to keep the lay-down areas, roads, bridges, walkways, and parking areas in a smooth and well-drained condition. During the winter months, the road supervisor will be supplemented by a dedicated snow removal superintendent. The superintendent will be charged with the task of removing the average snowfall of 30 feet over the 100 acres of jobsite. The general superintendent will coordinate with the equipment superintendent to assure that snow removal has top priority on the fleet utilization.

Bechtel Equipment Operations is organizing the fleet so that many of the traditional earthwork pieces will serve dual roles during the winter season. Dump trucks will be equipped with hydraulic snow plows and have gravel- and salt-spreading capability. This enables them to push and haul snow while increasing the footing for the craftsmen. Loaders will be equipped with quick-release buckets and plows. This will enable mass-loading hauling and clearing of heavy snowfalls.

Fencing

A perimeter fence will be erected to secure the construction site. Interior fences will be erected around substations and operating plant areas as the first train is started up and the other trains are under construction. This will establish the permit-to-work areas. Construction fences and snow fences will be erected with coordination provided by a local avalanche consultant in order to minimize fence damage and control the location of snowfall on the site.

Heavy Haul Facilities

The construction dock is equipped with three heavily reinforced areas that have dual purposes. Their first purpose is to allow the roll-on and roll-off of civil and bulk materials. Their second purpose is to provide a high-strength work surface for dock cranes engaged in unloading barges and ships.

The heavy haul road has been integrated into the plant road to provide the lowest total installed cost approach and give the operating plant the flexibility that a wide haul road affords. The dock facility will be equipped with dock lines, ramps, fire extinguishers, life vests, life rings, and steel plates for load distribution.

Construction Utilities

Temporary air for construction tools will be provided by a fleet of trailer-mounted compressors.

Temporary water will be detailed during the next phase of the project. We will perform a cost analysis to determine the combination of well water, pond water, or desalinated water that meets our overall job requirements. The driving forces of our water demands include the construction camp, concrete batch plant and hydrotesting the LNG tanks.

Temporary gas will include the use of bottled welding gases. Storage will utilize standard Bechtel racks and a maximum–minimum control system to trigger reordering based on local lead times for delivery.

Temporary fire protection will include a set of extinguishers mounted to each bottle cart. This will be supplemented by a water truck with rotating water cannon. After the fire water line is installed, the fire water loop will provide additional protection. Hot work permits and fire prevention will be the most effective means of protection.

Temporary sewage will be established with sets of portable toilets that are skid-mounted into groups of two and four so that heating in the winter can be accomplished efficiently. The periodic sanitation and disposal will be detailed during the next phase.

Temporary HVAC is included in each of the prefabricated buildings designed for Arctic Alaskan applications. The work areas will be heated with a fleet of portable units that have dedicated crews organized to install, maintain, and relocated them.

Temporary off-site hookups will be accomplished using a local third-party utility contractor to tie each of our site facilities into the respective grids. Our utility maintenance crews will work with the third parties to understand each of the connections.

Temporary Power and Lighting

During the first year, the site will run on diesel generators with backups. Along the access road right of way, we will install a permanent grid power line that will enable us to use the diesel generators strictly as back-up power.

The job site power distribution and lighting systems will consist of a complete loop around the site that is supplemented by branches traversing the loop. The overall arrangement will create a loop around each of the four trains as well as the three tanks and the utility and office areas. Inside these loops, the branch lines for construction power will be protected to support welding and other operations.

The substation and emergency generators will be located in the area that is designated for the batch plant during the first three trains. The batch plant and dock areas will have area lighting to support their frequent night operations. Other areas will rely on 12 trailer-mounted diesel light plants with telescopic light racks.

Miscellaneous Temporary Construction

The Valdez jobsite is particularly steep, and we anticipate the need for barriers. We will fabricate these barriers near the batch plant. Any waste concrete will be placed into the forms, thus eliminating waste and providing low-cost traffic attenuation at critical shoulder areas along the roadway. We will also utilize them for traffic control, road crossings, protection of substations, and personnel protection along roadways. Our warehouse will organize gang-boxes, sheds, signs, shelves, racks, stairs, platforms, and walkways at the general superintendent's direction.

Clean-Up

Bechtel will provide a fleet of dumpsters that have a 20-cubic-yard capacity for the collection and disposal of construction trash. One-hundred-and-twenty barrels of 55-gallon capacity will be located throughout the site so that they are convenient to the craftsmen. These barrels and dumpsters will be serviced by a collection crew that will assist the individual crafts by keeping the trash receptacles clean. The service crew will be equipped with a specialized truck and supplemented by the equipment superintendent's fleet as required.

Incinerators will be purchased to reduce the volume of construction trash. One of the incinerators will be capable of disposing of lubes and oils required by the construction fleet. The other will dispose of the typical wood, paper, and camp trash. The objective of the site will be to reduce out-bound trash to as close to zero as possible.

Housekeeping is an infallible sign of a well-organized, safe and profitable operation. Although this is a small work operation, it will be the focus of considerable daily work to assure it is accomplished as part of every work process.

Scaffolding

Scaffolding operations will utilize Bechtel Equipment Operations (BEO) to service the needs of the project. A combination of purchased and rental equipment will be acquired. Dedicated scaffolding crews working under permit will handle our needs. This work operation will be coordinated as part of our three-week rolling work schedule.

Material Handling

The material management will be accomplished using the procurement tracking system to monitor the procurement, receiving, warehousing, and material withdrawal requests. Each of the lay-down areas will be subdivided carefully into grid patterns.

The civil materials will be palletized and shipped so they are organized by structural foundation and labeled by drawing and tag number. Structural steel will be color-coded by plant area so that the side of each flange bears a color code for its area. Each piece mark will be painted as well to facilitate identification during the winter season. Pipe spool flanges will be color-coded in a similar fashion. Each major group of pieces within the grid will have a 10-foot section of rebar with an all weather permanent card marking the location of the hardware so that it can be efficiently located during heavy snowfall.

Dedicated warehousemen will service the civil, structural, mechanical, and E&I crafts. Spare parts will also have a dedicated warehouseman. The warehouse will be supported with a fleet of forklifts, boom trucks, cranes, man lifts, and tractor trailers.

During barge arrival and unloading, the equipment superintendent will work under the direction of the material management supervisor to discharge the cargo and place it in the designated lay-down areas.

Construction Equipment and Tools

The equipment superintendent will have a master mechanic to care for the fleet. The master mechanic will have journeymen mechanics with helpers to maintain the equipment. The fuel and lubes trucks will be manned by qualified craft during the peak.

The site will maintain a minimum-maximum stock for fuels, lubricates, filters, to care for the machinery. Each machine will have a periodic maintenance chart for the operator and mechanic to coordinate the manufacturers recommended periodic maintenance. This will enable the machine utilization to be optimized and downtime minimized.

The maintenance and lubrication facilities will be constructed of stacking two each 40-foot containers as walls and a heavy tin roof to protect the craftsmen. The ends of the buildings will have large sliding doors to enable large construction equipment to enter and exit the heated facility. A curbed area will be provided to contain all fuels and lubes.

Craft Testing

Welder certification will be conducted off-site and prior to the welder's arrival at the site. The only on-site welding tests will be to upgrade into additional welding processes.

Orientation

All personnel will attend a Bechtel Environmental, Safety, and Health orientation to familiarize them with the project requirements. Supervisors will have additional training regarding behavior-based safety. Confined space, hazardous materials, and fire-watch requirements will be part of the agenda, as well as jobsite and camp rules.

Drug Screening

Bechtel will establish an initial drug screening program that will be followed up by periodic random testing, and mandatory testing in the event of an incident or accident. The permissible levels will be established based on our existing agreements with the building trades.

Special Recruiting Activities

Bechtel Labor Relations will assist the project in recruiting qualified craftsmen to support the construction requirements. This recruiting exercise will be integrated with our Alaskan content program.

Unallocated Service Labor

The warehousemen will handle the distribution of water and ice and miscellaneous pickups and deliveries. Janitorial services will be handled by the temporary buildings superintendent.

Surveyors

Bechtel will arrive at the site with a team of surveyors that will establish a traverse consisting of temporary benchmarks. These points will be checked by an independent crew and will be the basis of dimensional control for the project lines and grades.

This system will be further developed into an elaborate system of benchmarks after clearing, grubbing, and blasting are completed. This will enable the survey crews to quickly and accurately establish all lines and grades for the craftsmen. Our desktop procedure will be issued during the next phase.

Watchpersons and Guards

A third-party firm will provide security for the site. The security captain will have an office adjacent to the BESH manager. The captain will have guards at fixed posts and roving the buildings, trains, docks, jetties, and shops. After the access road is installed, a gate guard will establish a permanent post at the plant entrance and control access and egress with an electronic identification card reader.

Construction Equipment On/Off

Construction equipment will be inspected for upon arrival for safety devices and mechanical condition. The master mechanic will arrange for the safe unloading, assembly, inventory, and start-up of each piece before it is deployed to the field. This is an important part of our fleet safety process.

When the piece is ready for demobilization, the master mechanic will dismantle, box, load, and secure the piece for transport. The maintenance history will follow the piece to the next project, thus continuing the process.

Manual Travel

Employee travel arrangements will be coordinated through the Human Relations travel coordinator, and will be in accordance to the employment conditions.

Winter Protection

The winterization superintendent and field engineer will be deployed to handle all aspects of our winterization program. They will interface with each of the other staff members and provide technical solutions to the heating, hoarding, equipment, fuels, buildings and other construction needs.

Maintaining the portable heaters and all screens, covers, and panels will be their responsibility. Scaffolding crews will be deployed to assist the team. Each phase of our EPC program will be analyzed independently by the winterization specialist to foresee and prevent weather related problems.

Batch Plant

Bechtel will mobilize concrete batch plants, and concrete, placing booms with high-pressure concrete pumps to service the concrete placement.

Construction Camp

Construction of the LNG Plants will require a construction camp in Valdez. Size, type, and layout of the construction camp will be completed during the next phase of the project.

There are several specialty companies available to provide camp catering, housekeeping and camp operating services.

Construction Offices and Lay-down Areas

Size and locations of construction offices and lay-down areas will be defined during the next phase of the project.

Construction Power

Construction and temporary facilities electrical power will be supplied by diesel generators located at various positions throughout the jobsite. Fuel will then be transported in a fuel/lube truck around the site to refuel each piece of construction equipment and each generator. A site visit will be required to determine the feasibility of obtaining electrical power from the existing infrastructure.

The use of gasoline should not be extensive and should be limited to small power tools and some vehicles. A local bulk fuel contractor will be used to also supply both diesel fuel and gasoline. Preliminary inquires indicate that sufficient fuel is produced on the North Slope to accommodate the needs of the project.

As part of a construction environmental plan, a detailed spill-prevention and control plan will be developed for the site and will define all flammable material storage requirements.

Construction air for pneumatic tools will be supplied by diesel-fueled portable air compressors. All welding and purge or shielding gases will be supplied in bottles.

Waste Storage and Disposal

A local service contractor will be engaged to supply dumpsters and arrange for their removal and disposal of the waste contents. Dumpsters will be supplied at various points around the construction site. It is anticipated that both burnable and non-burnable materials can be disposed of the landfill operated by the North Slope Borough.

Metal wastes, such as surplus carbon steel, stainless or alloy steel, or copper, will be segregated and accumulated on site. These materials will subsequently be shipped to Fairbanks for recycling.

The camp operator will be responsible for proper segregating and disposal of garbage resulting from the operations of the camps.

Construction Equipment

Construction equipment fleet requirements will be developed during the next phase of the project.

2.3.1.6 COMMISSIONING AND START-UP MANAGEMENT

Philosophy

The philosophy for pre-commissioning, commissioning, and start-up for the Alaska compression, pipeline and LNG facilities is to ensure safe, trouble-free initial plant operation and smooth operation for many years thereafter. In practice, this philosophy means:

- Start-up, operations, and maintenance knowledge is built into the design during the engineering phase.
- The commissioning and start-up team (C&SU team) will be led by an experienced Bechtel start-up manager and supported at the LNG plant by ConocoPhillips personnel. Several of the team members will have been involved in the FEED work and will be an integral part of the engineering and construction work.
- Bechtel will also supply senior operations personnel to assist with continuous operation of the facilities up until final takeover. Owner personnel will assist in commissioning and start-up activities wherever practical.

Engineering Feed Phase Activities

Senior members of the C&SU team will mobilize during the engineering phase to:

- Ensure that the engineering design includes input for proper operation, maintenance and start-up of the facilities;
- Participate in HAZOP reviews with HAZOP teams that include personnel with operations and maintenance experience;
- Advise engineering and procurement personnel so adequate commissioning spare parts are procured in a timely and cost-effective way;
- Prepare the draft pre-commissioning/commissioning manuals;
- Identify systems in a logical sequence for a safe start-up of the facility; and
- Prepare pre-commissioning, commissioning, start-up and turnover schedules.

Appendix QQ

RFA Section 2.3.1: Execution Plan

Environmental Management Plan

Contents

1.0 Environmental Management Plan 5

2.0 Environmental Principles 6

2.1 Environmental Controls 6

2.1.1 HSSE Management System 6

2.1.2 EMS Accreditation 6

2.1.3 Control of Significant Environmental Effects 6

2.1.4 Objectives and Targets 7

2.1.5 Contractor Management and Procurement 7

2.2 Environmental Principles in the Project Context 8

3.0 Key Environmental Management Issues 9

3.1 Construction Seasonality 9

3.2 Sensitive Environmental Resources 9

3.3 Permafrost 9

4.0 Environmental Support to Project Development and Execution 11

4.1 Project Development Phase 11

4.1.1 Pre-FEED Phase 11

4.1.2 FEED and Post-FEED Phase 11

4.2 Project Execution Phase 13

4.2.1 Engineering Design 13

4.2.2 Mobilization and Construction 13

5.0 Environmental Survey Requirements 16

5.1 Air Quality 16

5.1.1 Information Gaps 17

5.1.2 Information and Studies Needed to Fill Data Gaps 18

5.2 Soils and Permafrost 19

5.2.1 Existing Information 19

5.2.2 Information Gaps 20

5.2.3 Information and Studies Needed to Fill Data Gaps 20

5.3 Sand, Gravel, and Quarry Resources 21

5.3.1 Existing Information 21

5.3.2 Information Gaps 22

5.3.3 Information and Studies Needed to Fill Data Gaps 22

5.4 Seismicity 22

5.4.1 Existing Information 22

5.4.2 Information Gaps 23

5.4.3 Information and Studies Needed to Fill Data Gaps 24

5.5 Paleontology 24

5.5.1 Existing Information 24

5.5.2 Information Gaps 24

5.5.3 Information and Studies Needed to Fill Data Gaps 25
5.6 Water Resources 25
5.6.1 Existing Information 26
5.6.2 Information Gaps Specific to this Project 27
5.6.3 Information and Studies Needed to Fill Data Gaps 27
5.7 Wetlands 28
5.7.1 Existing Information 28
5.7.2 Information Gaps 28
5.7.3 Information and Studies Needed to Fill Data Gaps 28
5.8 Vegetation 29
5.8.1 Existing Information 29
5.8.2 Information Gaps 30
5.8.3 Information and Studies Needed to Fill Data Gaps 30
5.9 Freshwater and Marine Fish and Marine Benthic Organisms 30
5.9.1 Existing Information 30
5.9.2 Information Gaps 31
5.9.3 Information and Studies Needed to Fill Data Gaps 33
5.10 Wildlife 33
5.10.1 Existing Information 34
5.10.2 Information Gaps 35
5.10.3 Information and Studies Needed to Fill Data Gaps 35
5.11 Cultural Resources 36
5.11.1 Existing Information 36
5.11.2 Information Gaps Specific to this Project 37
5.11.3 Information and Studies Needed to Fill Data Gaps 37
5.12 Subsistence and Sociocultural Resources 40
5.12.1 Existing Information 40
5.12.2 Information Gaps 41
5.12.3 Information and Studies Needed to Fill Data Gaps 41
5.13 Special Use Areas / Areas of Critical Environmental Concern / Coastal Zone Management 42
5.13.1 Existing Information 42
5.13.2 Information Gaps 43
5.13.3 Information and Studies Needed to Fill Data Gaps 43
5.14 Visual 43
5.14.1 Existing Information 44
5.14.2 Information Gaps 44
5.14.3 Information and Studies Needed to Fill Data Gaps 45
5.15 Recreation 45
5.15.1 Existing Information 45
5.15.2 Information Gaps 45
5.15.3 Information and Studies Needed to Fill Data Gaps 46
6.0 References 47

List of Appendices

Addendum 1 Summary of Environmental Data Gaps

List of Figures

Figure 5.11.1 Flow chart showing the Section 106 review process in relation to the FERC cultural resource filing requirements 39

1.0 Environmental Management Plan

This Environmental Management Plan (EMP) is provided in response to the provision in section 2.3.1 of the RFA, which requests information on environmental management to be made part of the Project's Execution Plan. The key environmental management issues to be addressed in design and construction planning, and the role of the Project's environmental team during each phase of project development.

A key part of the EMP is the review of the data requirements for design and permitting, provided in Section 5.0. This section will guide development of scopes of work for the 2009 and 2010 summer field seasons, which are critical to the Project's overall permitting and regulatory schedule.

2.0 Environmental Principles

2.1 Environmental Controls

This section outlines the systems in place to ensure that our activities conform to the principles outlined above and that the environment is safeguarded. The following are key to ensuring that effective and appropriate controls are in place at all levels of the organization:

- Health, Safety, Security and Environment (HSSE) Management System
- Environmental Management System (EMS) accreditation
- Control of significant environmental effects
- Environmental monitoring and performance indicators
- Objectives and targets
- Contractor management and procurement

2.1.1 HSSE Management System

The management system to be developed for the Project will address the specific HSSE issues relevant to constructing a large diameter pipeline and LNG facility in Alaska. The Project's HSSE management system will be proactively promoted across the Project and adopted by the management team and subcontractors to ensure achievement of high HSSE performance standards.

Within the framework of its Project-specific management system, the Project will set a series of mandatory Environmental Standards which cover elements including climate change, air quality, water quality, biodiversity and environmental engineering. These Standards are supported will be supported by Environmental Guidance to promote the effective implementation of the Group's and Project's environmental standards.

2.1.2 EMS Accreditation

There are both internal and external benefits to independent assurance of the local HSSE management systems.

2.1.3 Control of Significant Environmental Effects

Processes in place to control the significant environmental effects of activities and to ensure that they are carried out in a responsible manner include:

- Identification of control requirements through standards and risk assessment
- Consultation
- Assurance processes including audit and review
- Contractor management and procurement

Identification of Control Requirements

A series of three registers forms the basis of environmental management processes in place to control significant environmental effects from activities. Each activity is preceded by an environmental impact assessment (EIA) process, and the relevant outputs of the EIA are recorded in the three registers outlined below.

The development is guided by environmental standards including those imposed by legislation and those established by self-regulating industrial codes of practice, oil and gas industry standards, and Company Standards.

Compliance Register. The Compliance Register serves as a point of reference for each project or activity and indicates what the requirements are, where the source documents are located, and who is responsible for compliance.

A **Hazards and Effects Register** records the results of the risk assessment of the activity in question. It forms a complete list of the environmental hazards and effects known or suspected from the activities undertaken, the controls to be applied to manage the risks, and responsibilities for ensuring the adequate functioning of the controls. This register is the result of an impact assessment process relevant to the planned activity.

A **Monitoring Register** for each activity defines the monitoring program, including what should be done, frequency, sampling and analytical techniques, responsibilities, and reporting of results.

Collectively, the registers are used during project implementation to provide information to staff in their day-to-day work or to allow the more effective planning of activities. Implementation of the necessary environmental control measures is conducted through development and execution of an activity specific HSSE Plan together with training.

Audit and Review

Assurance that the processes are in place to manage HSSE risks is given through a combination of performance reporting, implementation of a risk management process, peer review and assistance from skill centers, internal and external audit, annual letters of assurance, and independent verification.

2.1.4 Objectives and Targets

Environmental objectives specific to the project will be developed. These will be directed toward reinforcing and achieving Owners strategic objectives, as well as managing risks specific to the activities undertaken.

2.1.5 Contractor Management and Procurement

Contractors are required to operate systems to control HSSE performance to ensure that HSSE performance complies with the mandatory requirements. Some of the key aspects of this procedure include:

HSSE contract strategy – for high-risk contracts or where available contractors do not meet the required HSSE criteria,

Prospective contractors are provided with copies of relevant HSSE documentation, for example:

- HSSE goals and objectives
- HSSE Management System
- HSSE Policy
- Scope of HSSE plan and known hazards
- Specific contractor training requirements
- HSSE Plan – to be submitted as part of the bid documents and forms the main element considered during bid evaluation
- Audit and inspections prior to and during contract execution
- Performance review on contract completion

Assessing and Monitoring Contractor HSSE Performance

Monitoring contractor performance is an ongoing process. Specific inspections, reviews, and audits are undertaken of higher-risk activities such as contractor vessels and drilling rigs. Contractors are also required to report performance against the HSSE Management Plan prepared for the operation.

Particular areas of monitoring contractor HSSE performance include assurance of:

- The contractor's line management commitment to HSSE issues

- All HSSE related clauses in the contract and the HSSE plan are being complied with
- Contractor's internal HSSE control system is in place
- The contractor's monitoring of the quality, condition, and integrity of the plant, equipment, and tools
- The contractor's holding of toolbox and regular HSSE meetings
- Contractor's implementation of briefing and training required
- Contractor's implementation and participation in emergency exercises and drills
- HSSE risks arising from changes to plan are appropriately managed
- Compliance with incident and near-miss reporting, investigation, and follow-up

Inspections and audits provide additional methods for monitoring contractor HSSE activities. Regular inspections provide a means of checking compliance with contract requirements. The frequency of such inspections/verifications depends on the size of the work and the risks involved. Auditing provides the more formal and comprehensive assessments of adherence to the HSSE Plan.

2.2 Environmental Principles in the Project Context

Owner is committed to environmental protection and the incorporation of effective environmental management and mitigation into the base design and all planning and execution documents for the Alaska Infrastructure Project. Owner will implement an environmental management system (EMS) that requires environmental consideration to be an embedded element in all decision-making, and provides for setting of environmental goals and objectives and continuous measurement of progress in achieving such goals. These are well developed, proven systems that have been successful in supporting pipeline and LNG plant development projects for the past two decades in locations around the world.

Owner will retain senior managers, scientists, engineers, and permitting specialists who are well-experienced with major oil and gas development and transportation projects in Alaska and who played significant roles in design, planning, and construction oversight for other projects in the utility corridor from Prudhoe Bay to Valdez. This experience has been retained and integrated into the Project team in order to ensure that the Project has the full benefit of this experience in developing pipeline design and execution plans in Alaska and takes maximum advantage of lessons learned in planning, design, and operations that related to construction of a chilled gas pipeline in the corridor. The team includes personnel who have played prominent roles in designing similar transportation systems and in working closely with Federal and State regulators and resource management personnel to achieve successful design documents. Because of its interest in bringing Alaska gas to Alaskan's and the global market in the shortest possible time, and achieving gas deliveries by 2016, the Owner is committed to using these personnel to ensure that key environmental issues are recognized early in project planning and design and fully addressed.

This AGIA filing is a collaborative effort between the Alaska Gasline Port Authority and a cadre of Alaska-based and seasoned Alaska-experienced environmental managers and pipeline engineers. This team has worked together to create a framework for the Project that is attentive to the special environmental resource sensitivities in the pipeline corridor and that incorporates proven, reliable resource protection measures and safeguards to ensure that the Project is designed and executed to a high standard of resource protection. Once the AGIA license is issued in Spring 2008, the team will continue to bring these high standards of environmental awareness and protection to the next stages of design development and permitting, including Front End Engineering (FEED), Preliminary Design, Final Design, and Mobilization and Construction.

Additional information on the Capabilities of the Environmental Management Team can be found under Section 2.9 – Performance History and Project Capability.

3.0 Key Environmental Management Issues

Construction of large diameter pipelines in the arctic and subarctic poses a number of special challenges not present in more temperate climates. In Alaska, the weather extremes are compounded by an abundance of environmental resources of regional and national importance and special soil conditions that exert significant constraints on construction equipment and methodologies.

Through its extensive experience in Alaska and history of successfully executing large, schedule-driven energy development projects, the Owner team is well suited to operating in this environment. Members of the team and its Alaskan subcontractors have significant experience with heavy construction of systems and infrastructure in the harsh weather conditions of arctic and subarctic regions of Alaska.

These challenges are briefly discussed below.

3.1 Construction Seasonality

The regions of the State crossed by the gas pipeline route include a continental divide, two major mountain ranges, windswept subarctic foothills, and broad alluvial valleys with highly dendritic drainage patterns and many major river crossings. The route will impact a variety of natural resources, including fish and wildlife, and the livelihoods of peoples that depend upon these resources and live near the proposed project. In addition, the LNG plant could directly affect natural resources through direct disturbance, and indirectly affect natural and social resources over a much larger area.

Complicating planning for field surveys and construction activities are narrowly defined seasonal windows that vary by latitude and elevation, and are bracketed by early onset of cold and darkness. Effective use of these windows requires site-specific planning well in advance of deployments to the field, and application of equipment and methods that have proven reliability under remote and extreme conditions. A degree of self sufficiency, redundancy, and contingency planning beyond what is typically necessary in the Lower 48 is mandatory in Alaska. Additionally, special emphasis must be placed on the safety of operations and training of those engaged in field activities.

Because most work sites along the pipeline corridor will occur on public lands that are remote from existing conventional accommodations and services, effective advance planning of activities, logistics, and access authorizations, and deployment of communications, infrastructure, and emergency response support, is especially important. Seasonality can also have a significant effect on construction planning, with soil and ground conditions limiting operations to finite periods of the year that vary by location.

3.2 Sensitive Environmental Resources

Due to their remoteness and the absence of preexisting disturbances, many of the segments of the proposed pipeline route support fish and wildlife resources of significance to the state and nation. Sensitive life history stages of these species vary geographically and need to be understood and accommodated in project planning. Some resources, such as overwintering fish populations in interior streams, concentrate themselves in localized areas and become especially vulnerable to disturbance. Additionally, the range, density, and diversity of these resources vary from year to year, making it necessary to have contemporaneous survey data and for construction planning to include provisions for responding cost-effectively to unexpected resource discoveries to be encountered in the construction zone.

3.3 Permafrost

The long-term geotechnical stability of the gas pipeline is an important technical challenge faced by the Project. The problem of ensuring the long-term stability of this permafrost lead the designers of the Alyeska oil pipeline (faced with the necessity of maintaining oil temperatures in the pipeline above approximately 100°F) to support more than 50 percent of the entire length of the pipeline aboveground on pilings so the pipeline would not be in contact with the permafrost and induce thaw.

For the gasline project, there is no necessity for maintaining gas temperatures above freezing, as lower gas temperatures lead to greater pipeline efficiency and greater pipeline throughput. Sub-freezing gas temperatures will help maintain the permafrost in its frozen state, promoting pipeline and right-of-way stability.

Thus, this pipeline (throughout the permafrost zones) will be designed as a chilled gas pipeline, maintaining gas flowing temperatures at temperatures below 32°F. This permits the entire 800-mile long pipeline to be buried belowground. With the possible exception of several isolated river crossings, the Owner expects the entire pipeline to be buried except for a small number of crossings that may be more appropriate for aerial crossings.

At each compressor station, after gas pressure is increased by conventional pipeline gas compressors, a combination of heat exchange with the ambient air (depending on the time of year) plus mechanical refrigeration will be employed to lower gas temperatures below 32 degrees. Once the gas is discharged into the downstream pipeline, expansion-cooling of the gas (Joules-Thompson effect) will further reduce gas temperatures, such that station inlet temperatures will typically be in the range of 10 to 20°F. Chilled gas operation will maintain the permafrost in a stable state.

Experience with chilled gas pipelines in permafrost is currently very limited. A notable example of a chilled gas pipeline in operation since 1976 is the fuel gas pipeline that parallels the Alyeska oil pipeline (as well as the route of the proposed 48-inch gas pipeline) extending some 160 miles south from Prudhoe Bay. It was constructed to provide fuel gas to Alyeska's first four pump stations. The fuel gas pipeline is buried in continuous permafrost and has been in continuous and successful operation since 1976.

Concerns exist where a chilled gas pipeline passes through discontinuous permafrost. A pipeline operating at a temperature below freezing while passing through areas of initially-thawed soils given certain soil and groundwater conditions can be exposed to sufficient frost heave to induce high stresses in the pipeline over an extended time (periods ranging from multi-months to multi-years). This pipeline frost heave problem has been extensively studied and modeled for nearly 25 years as a consequence of the numerous and extensive prior studies directed at how to transport arctic gas economically to world markets. As well as being routed to avoid the areas where frost heave could occur, the frost heave mitigation features included in the design of the Project are expected to be successful in limiting and controlling pipe stress from frost heave.

An important concern has been identified at crossings of watercourses (e-g., streams and rivers). At these locations, chilled gas pipeline design will promote the development of a frost bulb around the pipeline, which could combine with normal seasonal freezing to create an ice dam above the pipeline. This ice dam could arrest the groundwater movements through the bed of the river, which sustain over-wintering fish. Also, ice dams may substantially interfere with the normal spring break up of arctic rivers.

The Owner intends to address this concern by combinations of the following:

- Routing to avoid riverbed conditions where ice damming will occur
- Deeper burial to avoid blocking water movement in the bed of the river
- Pipeline insulation

These measures are expected to control this problem and adequately address permafrost concerns.

4.0 Environmental Support to Project Development and Execution

Environmental managers, engineers and resource specialists will be integral members of all project planning and design teams and will play an active role in guiding project decisions on routing, siting, facility design, and construction planning from the outset of the Project's Development and Execution Phase. This section of the EMP describes the role the environmental team will play during these successive stages of the Project.

The environmental team will ensure that a Best Available Techniques[1] (BAT) assessment is undertaken at an early stage in order to minimize greenhouse gas (GHG) and other air emissions through design. The Energy Value Improvement Process (VIP) will be applied in order to identify practicable design opportunities to increase energy efficiency. In addition, the project will assess the physical implications of climate change on design early in the FEED phase. This will include forecasting of significant changes and ensuring that these are reflected in the project design to allow for adaptation over time.

4.1 Project Development Phase

4.1.1 Pre-FEED Phase

The Pre-FEED Phase of the Project will focus on project definition and establishment of the Project footprint, including desktop studies and performance of field reconnaissance surveys and routing assessments precedent to designation of the initial pipeline alignment and LNG plant site. Using available information from prior EISs and survey data for the pipeline corridor, environmental teams will provide guidance on sensitive areas and routing criteria and will participate in these reconnaissance surveys. Activities will also be focused on development of work scopes and study objectives for detailed baseline survey activities to be conducted in the 2009 field seasons. The environmental team will also contribute to the Process Design Basis and preparation of the FEED Design Basis, and will initiate procurement activities for ensuing work in 2009.

It is also expected that the environmental team will participate in initial meetings with FERC and environmental resource management agency staff during the Pre-FEED phase to reach agreement on key issues to be addressed in design development.

4.1.2 FEED and Post-FEED Phase

Activities during the FEED Phase will include continued refinement of Project concepts and routing and siting evaluations in conjunction with development of engineering and resource-related information for the initial applications to State and Federal regulatory and land management agencies. This will include developing the environmental basis for the pipeline and LNG facility design, as well as generating the project information used to initiate the regulatory review and permitting process. The following key deliverables are anticipated during the FEED Phase:

- Design Basis Memoranda (DBMs)
- Environmental input to Process Design
- Environmental input to procurement packages for subcontracts and major equipment
- Environmental input to design work for regulatory filings
- FERC Resource Reports
- Site Plans
- Route Maps and Preliminary Alignment Sheets

[1] Comparable to Best Available Control Technology (BACT)

- Conceptual Construction Plans
- Environmental input to capital cost estimates
- Preliminary Project Schedule
- BAT assessment and Energy VIP report

The Project's environmental team will have substantive contributions to each of these deliverables as well as oversee development of field data collection needed for design decisions and regulatory reviews. The environmental team will work on a fully integrated basis with the engineering teams for the pipeline and LNG facility. The environmental team will provide guidance on potential impacts, control technologies and impact mitigation, sensitive periods for construction activities, overall scheduling, and standards and constraints using the team's experience, review of applicable standards and regulations, review of previous planning and impact assessment documents for the utility corridor, and planning and coordination meetings to be held with regulatory and resource management agencies. The environmental team will serve as the conduit to provide input to the design team from the stakeholder engagement process (described in section 2.2.2) and from the regulatory process (described in section 2.2.4). The environmental team will also be the vehicle to identify to the design team, and provide to others, needed technical studies or documents that arise out of the stakeholder engagement activities and regulatory permitting endeavors. The guidance from the environmental team will be provided in the form of design criteria, performance standard summaries, avoidance criteria, maps and schedules, cost estimates, and inputs to sections of the DBMs and other design work products.

In addition, the environmental team will conduct regular internal reviews of design products, including those to which it has contributed, to ensure adequacy and completeness of the design basis.

The environmental team will report to the Project Director, and is expected to consist of the following key positions:

- Environmental Manager, responsible for integration of the environmental design basis into project design and ensuring effective collaboration between the environmental team and the Project Management and Project Engineering teams.
- Biological Resources Coordinator, responsible for fish and wildlife habitat planning issues and associated planning and design work products, as well as baseline data collection efforts. This position will be supported by fish, wildlife, and wetlands task managers.
- Environmental Engineering Coordinator, responsible for air, water quality, spill prevention, and hazardous waste planning issues and planning and design work products, including planning for temporary construction camps and baseline data collection efforts.
- Cultural and Subsistence Resources Coordinator, responsible for archaeological, historic, and Native issues and associated planning and design work products, as well as baseline data collection efforts and coordination with the National Historic Preservation Act (NHPA) agencies.
- Restoration Planning Coordinator, responsible for specialty planting and restoration issues and planning and design work products, as well as baseline data collection efforts and planning for seed and propagule collection and development to meet the needs of the Project.
- Arctic Civil Engineering Coordinator, responsible for environmental aspects of project civil design, including access road and material site development, surface water flow control structures, stream crossing plans, and erosion control plans.

These positions will be staffed early in FEED in order to plan for initial field data collection studies during the summers of 2009 and 2010. They will serve as the ongoing environmental leadership entity for future stages of design development and execution.

In addition to these core positions, the Project Management Team will deploy an extensive environmental and regulatory support organization responsible for managing and executing field studies, developing and

submitting the Project's Resource Report filings to the FERC and other concurrent filings to Federal and State land management agencies in Alaska, and providing ongoing support to each phase of Project development, including environmental inspection during the construction period. The structure and level of deployment of these additional resources will be aligned with evolving project demands.

The Post-FEED will continue the FEED-phase activities with ongoing environmental and permitting support to the regulatory review process and to design and construction planning.

4.2 Project Execution Phase

4.2.1 Engineering Design

The environmental team's input to the Design Phase of the Project will be to provide continuing support to pipeline and LNG facility design and provide ongoing information needed for regulatory reviews and approvals. The following key deliverables are developed during the Preliminary Design Phase:

- Detailed Site Plans
- Environmental Series Alignment Sheets
- Lists of Major Equipment
- Specifications for Major Equipment
- Preliminary Construction Plans
- AFE Quality Cost Estimates
- Detailed Project Schedules

As during the FEED Phase, the Project's environmental team will have substantive contributions to each of these deliverables and will oversee ongoing development of field data collection needed for design decisions and regulatory reviews. Work products will be consistent with requirements for regulatory agency filings and permit applications, and will be compatible with overall engineering and construction planning documentation. Environmental specifications for long-lead equipment orders will be written in a manner and format compatible with the overall procurement packages.

Environmental input to Final Design will be in accordance with the Owners standard procedures, all applicable codes and standards as required by government statutes and regulations, and the specific requirements of the Project's National Environmental Policy Act (NEPA) documents, and Federal, State, Tribal, and local permits and other authorizations. Design products will include final plans and specifications to support procurement activities, including bid requests and selection of facility and pipeline spread construction contractors; Issued for Construction (IFC) drawings, alignment sheets, and specifications; and final facility designs and plans for permitting and regulatory approval processes.

4.2.2 Mobilization and Construction

The Project's environmental team will participate in final bid evaluation and selection for pipeline spread contractors and facility construction contractors, and will assist in development and review of plans required to support construction activity. In addition, the environmental team will prepare and oversee implementation of environmental orientation and awareness training for project personnel and subcontractors. The environmental team will provide ongoing environmental support to field engineering, and will manage regular environmental reporting required by permit conditions, as well as response to unanticipated discoveries during construction.

Project environmental personnel will also conduct and/or oversee construction and post-construction environmental inspection services for compliance with environmental regulations and achievement of Owner's project specific goals and objectives. A robust internal environmental inspection program will be developed and implemented to meet conditions of the FERC certificate and ROW authorizations. The

inspection program will be developed in collaboration with the regulatory agencies and is expected to serve as a full-time inspection capability augmented by agency inspectors and/or third-party monitors.

Because of the scope and complexity of the Project and its associated environmental and socioeconomic issues, an additional third-party Environmental Compliance Monitoring Program (ECMP) likely will be required by the regulatory agencies for added compliance assurance. The dedicated third-party ECMP contractor will provide full-time, on-site environmental construction compliance monitors, thereby eliminating the need for each agency to staff a separate monitoring effort. It is anticipated that the ECMP will be funded by Project, but will be directed by the key Federal and State agencies, most likely with the FERC as the lead. Compliance monitors will not be subject to the direction or control of the Project, except to the extent necessary regarding Project health, security, and safety.

Key elements of the ECMP will include the following:

- A full-time third-party Compliance Manager, as well as one (or more, depending on assessed Project needs) on-site Compliance Monitor for each of the construction spreads;
- An Interagency Compliance Committee (ICC), comprised of representatives from the agencies to whom the third-party contractor will report;
- Procedures for coordination among the Compliance Monitors, Project team, Project team Environmental Inspectors (EIs), and other construction personnel, so that issues identified during field reviews can be resolved quickly;
- A systematic strategy for the efficient review and approval (preferably in the field) of variances to Certificate, license, and permit requirements that are needed to respond to site-specific conditions;
- A communication strategy to keep the agencies and others informed regarding inspection and monitoring activities and issues; and
- A Project website developed and maintained by the Project to post daily and weekly inspection reports submitted by both the third-party contractor and the Project's EIs.

As noted, many of these organizational elements also will be adopted by or used by the Project internal EIs. The Project EIs will work closely with the EMCP Compliance Monitors.

The primary objectives of the ECMP will be to:

- Assess overall compliance with the environmental requirements during construction;
- Provide for daily communication among the Compliance Manager, Compliance Monitors, the agencies, and Project EIs to achieve and maintain compliance with the environmental requirements;
- Facilitate quick response and resolution of environmental compliance concerns observed in the field;
- Provide regular feedback to the agencies regarding construction progress and overall compliance of the Project with the environmental requirements;
- Monitor implementation of construction measures to achieve compliance as documented in the Owner's daily inspection reports and determine the efficacy of construction measures to achieve compliance with the environmental requirements;
- Facilitate the prompt and efficient processing of requests for modifications to, or variances from, the Certificate, license, or permit conditions issued relative to the Project, as necessary to facilitate the orderly construction of the Project;
- Facilitate the prompt resolution of disputes regarding environmental compliance; and,

- Provide daily and weekly reports to the ICC that contain thorough, accurate, and timely documentation of environmental compliance for the Project.

The ECMP will facilitate clear and consistent communication between the Project team and the agencies and among the agencies, reducing or eliminating potential conflicts among the various interests and expediting any required approvals. *The ECMP will not affect or limit the jurisdiction of any individual* Agency or the right of any individual agency to take any action that is deemed necessary or appropriate regarding the Project. The ECMP will not expand the jurisdiction of any individual Agency or authorize any individual Agency to take action beyond its regulatory jurisdiction.

Central to the ECMP is the concept that so long as no violation of the environmental requirements occurs, the choice of construction technique will be at Owner's discretion. Also central is the concept that there often will be multiple solutions to an environmental issue, particularly where the environmental requirements are performance-based. These concepts will promote orderly construction with optimal environmental compliance and will foster the efficient implementation of remedial measures with optimal environmental protection.

Another key element of Compliance Monitoring is the "Stop-Work" process. Work stoppage will be implemented in any situation where environmental resources are being impacted (or where there is an imminent threat they will be impacted) in a way that is in violation of or otherwise inconsistent with the environmental requirements. Work can be stopped for this reason by Project EIs, ECMP Compliance Monitors, and/or agency personnel (within the limits of their jurisdiction), each with slightly different limits on their stop-work authorities. A stop-work order will be rescinded once the threat or violation has been alleviated and work sites are safe and stable and do not create a risk to workers.

5.0 Environmental Survey Requirements

The natural and social resources that could be impacted by the Project are generally well described as a result of studies and permitting in support of the construction and operation of the Trans-Alaska Pipeline System (TAPS), the TAPS ROW Renewal EIS and Environmental Report (ER), oil- and gas-related development on the North Slope and at the Valdez marine terminal, and the series of natural gas pipeline proposals that have been permitted in past decades (e.g., the Alaskan Natural Gas Transportation System (ANGTS) EIS, the Trans Alaska Gas (TAGS) System EIS, the TAGS LNG Project EIS) to construct a natural gas pipeline in the vicinity of TAPS.

The Project applicants are committed to moving quickly forward following award of the AGIA license in April 2008. This is important in order to prepare for a fast start to the pre-FEED phase. To support a quick start, the applicants have reviewed available information on the pipeline corridor and LNG plant site, and conducted a focused data gap analysis to determine the additional information that will be needed to adequately evaluate resources potentially impacted by the project, as well as the environmental data required for design decisions and for any additional permitting. In particular, additional information will be needed for those areas outside of the area of study for the TAPS and TAGS that could be impacted by the proposed project. This will apply to all resource areas. Additional supplemental information will be needed for some resources (e.g., cultural resources, wetlands) found within the TAPS area of study, where information is limited or additional information is required to update existing information, or to meet new agency requirements that may not have applied at the time of permitting and evaluation of the TAPS and TAGS.

The following describes the current state of information on key natural and social resources that could be impacted by the AIP pipeline, LNG plant, and support facilities, and types of additional information that will be required to adequately characterize impacts from the Project to these resources. The results of this data review and gap analysis have been used to develop a framework for environmental field studies to be commenced during 2009 and 2010.

Key sources of information for this review include:

- 1988 TAGS Project-wide Final EIS (TAGS EIS).
- 1995 Yukon Pacific LNG Project Final EIS (LNG Project EIS).
- 2001 Draft Environmental Report for the TAPS ROW (TAPS ER).
- 2002 Final EIS Renewal of the Federal Grant for the Trans- Alaska Pipeline System Right-of-way (TAPS Renewal EIS).
- State and Federal agency websites and databases.
- Scientific and technical reports prepared in support of oil and gas development on the North Slope.

It is expected that the information gained from these document reviews and proposed Project studies will be used in NEPA analysis and permitting, for pipeline routing modification of any and site selection studies for the compressor station #1 and the chilling unit, in-line compressor stations, and other project facilities, and for design development..

Addendum 1 provides a summary of the categories of data gaps identified in the review and the range of studies to be performed beginning in 2009 to fill these gaps. These general scopes will be further refined in consultation with FERC and pertinent land and resource management agencies, and provide a basis for work plans for the 2009 and 2010 field seasons.

5.1 Air Quality

To protect human health and welfare, National Ambient Air Quality Standards (NAAQS) and Alaska Ambient Air Quality Standards (AAQS) establish maximum air pollutant levels that are not to be

exceeded. In addition, Prevention of Significant Deterioration (PSD) regulations limit the maximum allowable incremental increases in ambient concentration above an established baseline, with smaller increments established for Class I areas, such as national parks or wilderness areas. The Project pipeline route will pass through two of Alaska's four Air Quality Control Regions (AQCRs). The only designated nonattainment areas for NAAQS in the vicinity of the TAPS ROW are in Fairbanks and North Pole, which are designated by the U.S. Environmental Protection Agency (USEPA) as in nonattainment for carbon monoxide. The ROW is approximately 80 miles from the nearest Prevention of Significant Deterioration (PSD) Class I area (Denali National Park).

Monitored ambient air quality data are available for areas in the vicinity of three TAPS facilities, and is described using modeled data for the remaining facilities. Past and current monitoring data have also been collected for major facilities at Prudhoe Bay/Kuparuk River Unit, in Fairbanks and North Pole, and at the Valdez Marine Terminal. Hazardous air pollutant ambient concentrations were collected at the Valdez Marine Terminal in the early 1990s. Information on visibility associated with heavy fogs and ice fogs is measured at six National Weather Service stations near the TAPS ROW, and for visibility impairment associated with pollutants at Denali National Park.

The TAPS ROW Renewal EIS lists the size and number of stationary sources permitted to operate at each of the TAPS pump stations and the Valdez Marine terminal. The Renewal EIS and Alaska Department of Environmental Conservation (ADEC) Operating Permits provide estimated emissions of criteria pollutants, volatile organic compounds, hazardous air pollutants, and ozone depleting substances at these facilities, from vehicle emissions associated with TAPS operation, and from major facilities in areas adjacent to TAPS facilities in 2001. Major facilities at Prudhoe Bay and Kuparuk River Unit are sources of major pollutants associated with other major facilities in areas adjacent to TAPS. The TAGS EIS and TAPS ROW Renewal EIS examined cumulative effects to air quality from existing and probable future actions, including construction and operation of a natural gas pipeline.

Air emissions modeling was done in support of the TAGS. Based on this analysis, emissions from construction of a gas pipeline, LNG plant, and other facilities will be minor. Operation emissions were estimated for the Compressor Stations, LNG Plant, and LNG Terminal. Based on modeling, compressor stations are not expected to cause long-term air quality impacts. Emissions at the LNG plant and marine terminal are not predicted to exceed NAAQS but could exceed PSD significant impact levels. The emissions sources having the greatest impact would occur in the Anderson Bay area. Air emissions associated with the gas conditioning plant were evaluated, but not in great detail due to high uncertainty by USEPA regarding plant design characteristics. One of the purposes of the plant (to be developed by others) will be to reinject CO_2 into the Prudhoe Bay fields to enhance oil recovery, and minimize the amount of CO_2 (a greenhouse gas) released into the atmosphere. Earlier studies noted that the gas conditioning plant will have minimal cumulative effects on air quality.

Air emissions likely to occur at the proposed plant and marine terminal include fugitive dust emissions during construction, and emission of gaseous criteria pollutants from construction, normal operation of natural gas-fired turbines and equipment, fuel use in LNG tankers, and operation of an incinerator and wastewater treatment systems. Ambient air information had been gathered by Yukon Pacific at Anderson Bay in 1989, and by Alyeska Pipeline Service Company (APSC) at several sites around Valdez since 1989.

5.1.1 Information Gaps

Information on air emissions is not available for Project pipeline facilities. Proposed Project gas pipeline and LNG facilities will have to comply with New Source Performance Standards and apply for operating permits under the State's Title V permitting program under the Clean Air Act. Some equipment will also be regulated under the State's PSD program. In addition, information on air emissions associated with the project will be needed for FERC licensing, preparation of the Project's EIS Supplement or new EIS, to support the study plan requirements for State (AS 38.35.050) and Federal pipeline ROW lease, and to ensure that Project facilities comply with air regulations and do not cumulatively contribute to exceedances of air quality standards.

Studies and modeling will be needed to estimate air pollutant emissions associated with Project gas pipeline facilities to ensure that emissions do not exceed NAAQS and AAAQS and comply with PSD air quality regulations. Additional monitoring may be required at Anderson Bay and other locations along the Project pipeline route to adequately characterize background air quality levels. The results of these studies could influence the types and sizes of equipment used, control technologies, and the location of certain facilities, especially those located near nonattainment areas (North Pole and Fairbanks), in areas with major industrial facilities (Prudhoe Bay and Valdez), and near Denali National Park.

5.1.2 Information and Studies Needed to Fill Data Gaps

Information from existing sources described above will be used to characterize the baseline environment. This work will rely on most recent information from monitoring stations along TAPS and from estimates of air emissions given in operating permits for TAPS and other major industrial facilities in proximity of the proposed gas pipeline. New emissions associated with TAPS facilities will also be considered, should the amount of oil transported through the pipeline increase in the future.

Discussions will be held with Federal, State, and local officials prior to beginning modeling and other studies to determine sources of the most current data, need for additional baseline air quality monitoring, and other project-related issues needed to comply with permitting and NEPA EIS/FERC licensing requirements. As noted above, air quality data have been collected from numerous locations on the North Slope, at Valdez, and Anderson Bay and may be available for use during this project.

Modeling will be conducted to characterize air emissions associated with the Project and in the design and siting of facilities to ensure that proposed project facilities comply with Federal and State air regulations and do not cumulatively contribute to exceedances of air quality standards. PSD regulations impose specific limits on the amount that new or modified stationary sources may contribute to existing air quality levels. Modeling will be done to ensure compliance with applicable increments and to determine impacts to nearby Class I areas. Modeling will also be used to determine appropriate Best Available Control Technology (BACT) to further reduce emissions. Types of information that will be used in estimating air emissions include emissions data from equipment manufactures, studies of emissions associated with the operation of similar gas pipeline and LNG facilities, and emissions modeling used in support of the TAGS and TAPS, and from USEPA AP-42 emission factors.

Modeling will be required to estimate air emissions from construction and operation. Major construction emissions will include fugitive dust and exhaust emissions associated with construction equipment and general construction traffic, boat exhaust emissions at the LNG plant and terminal, camp heating and waste incineration, and burning of slash and other materials. Operations emissions will be associated with the compressor stations, and LNG plant and terminal. Emissions modeling efforts will be similar to those conducted for the TAGS, but will use more current air emissions and dispersion models, will be based on equipment, facility, site, and other construction and operations characteristics unique to this project, will assess air emissions based on current standards, and will include estimates for greenhouse gas (CO_2) and other greenhouse gases. In addition, modeling will be needed to assess air emissions from the proposed gas conditioning plant (to be constructed and operated by others), which were not evaluated in the TAGS EIS. Based on cumulative effects analysis done for the TAPS ROW Renewal EIS, air emissions associated with the Project are not expected to exceed ambient air quality standards; modeling will be done for the Project to better determine the cumulative effects or air emissions from the proposed project and associated activities including marine operations

Based on the schedule developed for this proposal, preliminary modeling may be performed during Year 1 to assist with pre-FEED and initial siting of facilities. Additional modeling and collection of baseline air quality data (if needed) will be done during Year 2 based on final determination of types of equipment to be used and location and types of facilities to be constructed. An Air Quality Plan will be prepared to support State and Federal ROW lease applications.

5.2 Soils and Permafrost

Soils and permafrost characteristics vary greatly along the proposed ROW. The origins of the soil range from bedrock; glacial till and outwash; sand, silt, and clay, colluvium; to windblown silt and fine sand.

Permafrost issues were previously discussed in Section 3 of this Environmental Management Plan as being one of the key challenges facing the Project. Permafrost is found extensively along the Project corridor and the depth to the active layer ranges from one foot to about 15 feet. Regional warming that has occurred during the past 25 years in Alaska has lowered the permafrost table because of thawing near the southern margin of the permafrost. The degradation of permafrost could impact the integrity of the pipeline and cause slope on permafrost to become unstable. The impact of this will be studied further during the FEED phase of the project and potential impact and mitigation will be assessed for the full project life cycle.

Much of the proposed Anderson Bay site is on steep slopes with poorly drained organic soil or well-drained mineral soil. There could be severe limitation for structures and other engineering uses due to the steep slopes.

5.2.1 Existing Information

Soil and permafrost conditions (continuous, discontinuous, absent) have been described for the 10 physiographic provinces in Alaska associated with the Project. Factors leading to the development of soils, and depth to permafrost and its thickness have been described, as have geomorphic process related to soils and permafrost, in particular mass wasting and permafrost degradation and aggradation.

Soil and permafrost could be impacted from development of a gas pipeline and associated facilities. An estimated 22,910 acres were to be disturbed during construction of the Project. Gas is to be chilled for the TAGS during transport in areas with continuous or discontinuous permafrost. Heavier wall thickness pipe was proposed in areas with frost heave, seismic ground motion, and other geotechnical conditions that could impact pipeline integrity. Techniques that will be used during preconstruction and construction of *the pipeline and facilities were described. Previous studies identified areas along the proposed Project* pipeline route where areas with unstable soils occur and areas susceptible to frost heave, soil erosion and siltation of streams, localized thawing of the permafrost, and mass wasting occur.

The shoreline at the proposed Anderson Bay site consists of steep rocky cliffs and soils consist of poorly drained organic soils and mineral soils on better drained sites. The soils are seldom frozen, but have severe limitation for structures and other engineering uses due to the steep slopes. Revegetation potential of soils is moderate to high. Approximately 10 million cubic yards of overburden and rock will be excavated to construct the LNG facility.

Several sites along the TAPS ROW have experienced the effects of mass wasting and pose pipeline stability concerns that are under close monitoring. The effects of degradation and aggradation of permafrost on the TAPS is primarily through heaving, subsidence, or thermokarst, and solifluction of the soil near the pipeline, access roads, workpads, and material sites. Frost heave and subsidence have led to pipeline instability and caused leakage of oil. Of the 70 contaminated sites along the ROW, 27 are still active, while eight of the 17 contaminated sites at the Valdez Marine Terminal are still active. Contamination has primarily resulted from the release of fuels and crude oil at pump stations and previous construction camps.

Construction and operational activities will impact soil and permafrost. Excavation and use of equipment to transport, bury and service the proposed natural gas pipeline can result in drainage, surface subsidence, ponding and slope stability problems. Road dust can reduce snow cover and vegetation, and thus affect soils and permafrost; these impacts along the Dalton Highway could increase if a gas pipeline is constructed. Heat transfer from the buried oil pipeline has created thaw bulbs that promote frost heaving and settlement. Chilling of the natural gas for the proposed project should reduce or eliminate this impact. A trend of warming climate could lead to changes in permafrost and groundwater conditions sufficient to result in mechanically weaker soils. The potential for liquefaction of soils and landslides has the potential to threaten the integrity of the TAPS and the proposed natural gas pipeline. Areas prone to

liquefaction were avoided during construction of TAPS and the same process will be followed for the proposed natural gas pipeline. With global climate changes, however, the risk of encountering liquefaction and landslides will be expected to increase.

5.2.2 Information Gaps

Site-specific information is available along the TAPS to identify areas where the potential for loss of soil productivity, erosion, mass wasting, sediment impacts to streams, and frost heave are greatest. Site-specific studies will be needed for the Soil and permafrost conditions (continuous, discontinuous, absent) have been described for the 10 physiographic provinces in Alaska associated with the Project. Factors leading to the development of soils, and depth to permafrost and its thickness have been described, as have geomorphic process related to soils and permafrost, in particular mass wasting and permafrost degradation and aggradation, to confirm conditions observed along the TAPS ROW, and to identify new areas susceptible to risks where the proposed pipeline deviates from the TAPS/TAGS ROW or where soil conditions have changed since studies were conducted for the TAPS/TAGS ROW. This information will be needed to identify a pipeline route and facility footprints to reduce these risks and to develop mitigation measures to reduce risks to soil where they cannot be avoided. Large amounts of material will have to be removed to expose the bedrock to construct the LNG site, and major cuts will have to be made into hillslopes that could result in rockslides and slope failures. If a similar site or techniques are used for the proposed project, studies will be required to determine how to minimize erosion associated with exposed soils on hillslopes to protect nearby wetlands and other waterbodies.

Information on soils and soil hazards, and construction techniques, will be needed to prepare the Construction General Permit, Storm Water Pollution Prevention Plan, and Erosion Control Monitoring Plan (USEPA) for the proposed project, and to assess impacts and develops Best Management Practices (BMPs) and mitigation needed for FERC licensing and the NEPA EIS. In addition, Clearing, Erosion and Sediment Control, Overburden and Excess Material Disposal, and Restoration plans will be needed to support the study plan requirements for State (AS 38.35.050) and Federal pipeline ROW lease applications.

5.2.3 Information and Studies Needed to Fill Data Gaps

Although information is available on soil and permafrost conditions along the TAPS and proposed TAGS pipeline routes, a site-specific reconnaissance of the pipeline route and facility sites will be required to identify areas where pipeline and facility construction could lead to soil erosion, sedimentation of streams, mass wasting, permafrost degradation, and frost heave impacts. In particular, field studies will have to focus on those portions that deviate significantly from the existing TAPS ROW.

Disturbance of the natural ground surface could cause increased surface heat input to permafrost during summer and cause degradation. In addition, it may be a year or more before chilled gas is introduced into the pipeline, increasing the risk of heating of the adjacent soil and saturation of the backfilled materials, increasing the buoyancy of the pipe. Thermal modeling is proposed to assess the effects of disturbance caused by clearing, placement of workpads, and ditching. Surveys will focus on proposed Project construction sites near streams; where warming of the permafrost that leads to melting of the ice-rich soil, soil erosion, and siltation of streams; and on hillslopes, where erosion could lead to the loss of pipeline supporting materials.

Frost heave, or upward movement of the soil mass, is a major design consideration for the proposed pipeline. Frost heave can impact the integrity of the pipeline. Although large amounts of laboratory and full-scale frost heave data have been collected by private and public organizations, it will be necessary to collect additional field and laboratory data in order to predict the behavior of frost-heave-susceptible soils along the proposed pipeline ROW. In particular, frost heave impacts to pipeline integrity are greatest in areas subject to flooding and stream erosion. Site-specific studies will identify areas where pipeline integrity could be affected by frost heave and mitigation measures will be identified during design and construction to minimize risks to pipeline integrity.

As the proposed pipeline ROW passes through rugged and steep topography, the potential for erosion and mass wasting on hillslopes is substantial. Information on how slopes along the proposed Project route might respond to pipeline construction has been gained from TAPS construction and operation. The proposed TAGS ROW avoided areas marked by surface indicators of naturally occurring active slope instabilities. Early in the routing and design process, further work will be needed for the Project to confirm that the proposed route avoids areas with slope instability. The northern foothills of the Brooks Range and between the Yukon River to Delta Junction are areas where there is the highest risk of mass wasting.

Studies and analysis of potential impacts to soils will be critical during the design process in order to identify areas that are susceptible to permafrost degradation, soil erosion, mass wasting, and frost heave impacts. Based on preliminary studies, pipeline routes and facility locations could be modified, as needed, to reduce these risks. In addition, mitigation measures, such as construction scheduling (winter construction in ice-rich areas), specialized construction zone grading, insulating of work pads, footprint minimization, phasing of soil-disturbance-related activities, and erosion control measures could be identified and included in the pipeline and facility design and grading design. Such measures will ensure that soil impacts are kept to a minimum and the structural integrity of the pipeline is assured. Erosion control measures will be included in the Storm Water Pollution Prevention Plan. Streambank erosion control measures will include those identified in the Streambank Revegetation and Protection: A Guide for Alaska (Alaska Department of Fish and Game [ADF&G]) and in the LNG Project EIS. These measures will be developed in consultation with Federal, State, and local agencies.

Based on the schedule developed for the Project, identification of areas of concern and site reconnaissance will be done during Year 1 to assist with pre-FEED and preliminary siting of facilities. Additional field studies and field and laboratory studies will be done during Year 2 to determine final pipeline routing and location of facility footprints, and to develop mitigation measures. Clearing, Erosion and Sediment Control, Overburden and Excess Material Disposal, and Restoration plans will be prepared in support of ROW leases. During operation, monitoring will be required to identify areas where erosion, mass wasting, permafrost degradation, and frost heave are occurring and to take measure to prevent impacts to pipeline integrity and nearby resources, including soil. Revegetation monitoring will be required during construction, operation, and closure. A Surveillance and Monitoring Plan will be prepared to support these efforts.

5.3 Sand, Gravel, and Quarry Resources

Construction of the Project pipeline and its associated facilities will require large volumes of gravel aggregate for the ROW preparation, access roads, foundations, and specialized ditch backfill. These materials are needed to insulate the sensitive permafrost regimes. Preliminary estimates for the TAGS project indicated that 33 million cubic yards of aggregate could be required. Where feasible, the Project will reuse construction areas where gravel pads and access roads remain after TAPS construction. In addition, the proposed project will use ice and snow workpads to reduce aggregate material needs, as has been done effectively for development on the North Slope. At this stage it is envisaged that in excess of 20 million cubic yards of aggregate will be required for the Project.

5.3.1 Existing Information

Sand and gravel resources have been described along the TAPS ROW. Deposits of sands, gravels, and quarry stones are abundant along the TAPS ROW, especially along the three mountain ranges crossed by the pipeline. Currently, APSC has contracts to purchase granular materials from 69 borrow sites and all of these sites are on public land. Most of the sites are jointly used with the State of Alaska, and presumably will be available to the Project operators. These sites are a quarter mile to a few miles from the TAPS. Most of the bedrock quarries are located on the Kokrine-Hodzana Highlands and the Yukon-Tanana Uplands, while most of the sand and gravel pits are on the floodplains of major rivers. Sites, material types, volume extracted, remaining estimated yield, and work area along the TAPS are available. During the late 1990s, the annual use of borrow material from these sites ranged from 30,000 to 97,000 cubic yards for the TAPS, while Alaska Department of Transportation and Public Facilities needs are estimated at about 1.5 million cubic yards annually.

The cumulative effects of mining sand, gravel, and quarry resources for the TAPS, proposed pipeline project, State highway projects, and other development should be minor as these resources are abundant.

5.3.2 Information Gaps

Information is lacking on the sources and amounts of mineral materials needed for the Project, and specific project areas where mineral materials will be required. Ice and snow roads and pads are proposed for more northern portions of the project, reducing mineral materials needs on that portion of the project. Emphasis will also be on obtaining mineral material sources from upland sites, and these will need to be identified. In addition, it is not known how much gravel will be available to the applicant from existing sites associated with the TAPS ROW. Once sites are identified, access routes from the mineral site to the ROW will have to be constructed. Finally, BMPs and reclamation measures will have to be implemented for mineral material sites and access roads. If sites are developed along streams or rivers, additional consideration will have to be given to effects on fish and their habitat and BMPs needed to protect water quality. This information is needed to obtain approvals for mineral sales on State- (Alaska Department of Natural Resources [ADNR]) and Federal- (BLM) administered lands, to support the study plan requirements for State (AS 38.35.050) and Federal pipeline ROW lease applications, and to assess impacts and develops BMPs and mitigation needed for FERC licensing and the NEPA EIS.

5.3.3 Information and Studies Needed to Fill Data Gaps

During project development and FEED, the location of the proposed pipeline and facilities will be identified. Initially, the Owner will consult with APSC, State of Alaska, and BLM to determine if existing mineral resources near the TAPS will be available for use. Based on this information, surveys will likely be needed to identify additional mineral material sources and access roads. As noted above, the focus of efforts for new sites will be on upland sites. Sites will be evaluated based on the types and amount of available mineral material, proximity to the ROW, and ability to construct an access road from the ROW to the site. In addition, the effects of gravel and aggregate mining on soil, water, vegetation, fish and wildlife, cultural, and other resources will be evaluated in determining the suitability of the site for mining. Once suitable sites are identified, the Project Sponsors will develop detailed mining plans showing how the site will be accessed and mined, and BMPs to stabilize and revegetate the sites and to prevent fuel spills. If material extraction is from river gravel bars, effort will be made to mine gravel from above water levels, during winter, to minimize sedimentation and effects to fish.

Based on the schedule developed for this proposal, discussions with APSC and State/Federal agencies will be held during Year 1 to identify mineral material needs and existing resources that could be used by the applicant. Based on these discussions, and FEED, surveys will be conducted during Year 2 to identify other mineral material sources. Once these sites are identified, Federal and State approval to use these sites will be sought by the applicant. There is the potential that additional mineral material resource sites will be required to meet project needs during operation.

5.4 Seismicity

Seismic activities, or earthquakes, are generally closely related to movements of land along faults or ruptures in the geological material. Long faults tend to be sites for large earthquakes, and faults that have had more recent movements tend to be more active. Three major fault zones will be crossed by the proposed pipeline, the Donnelly Dome, Denali, and McGinnis faults between Delta and Summit Lake. The major hazards affecting pipeline operations in these areas are 1) differential movement along the fault zone; 2) soil liquefaction; and 3) ground motions. A major design criterion for a natural gas pipeline system will be the ability of the system to withstand the effects of a major earthquake.

5.4.1 Existing Information

Seismic phenomena that could impact the Project include 1) soil liquefaction and ground breakage; 2) ground motion, including potential slope failure; 3) differential movement along a fault; and 4) water inundation by earthquake-generate waves. Three active faults associated with the Denali fault system cross the Project route. The Donnelly Dome fault crosses the Richardson Highway near the proposed

route, just north of Donnelly Dome. The McGinnis fault crosses the route near Lower Miller Creek. The Denali fault crosses the route between Lower Millers Creek and Millers Creek. The Denali fault is the longest and most conspicuous fault in Alaska. There is abundant evidence of right-lateral displacement and a long history of movement along the Denali fault. Offset drainage systems, scarps, and sag ponds indicate Holocene movement along the fault. A damaging earthquake as large as magnitude 8, accompanied by fault offsets of at least 20 feet, could occur along this fault zone. This could result in loss of pipeline integrity due to fault displacement and subsequent pipeline deformation.

Extensive geoseismic studies and reports were prepared for the Yukon Pacific's FERC filing for the LNG project. These reports identified the major faults that could affect the proposed LNG plant. Tectonic subduction is the driving mechanism for ongoing seismicity in the Valdez area. The old site of the town of Valdez suffered extreme damage in the 1964 earthquake. Damage was the result of a massive submarine landslide and ground motion in the saturated, fine-grained deposits of the Valdez delta on which the town was located. However, the proposed Anderson Bay site is located on bedrock that is not subject to the types of liquefaction effects that resulted in Valdez. Events of this magnitude occur about every 700 years, and thus risks of another major earthquake during the life of the LNG facility was neglected for design purposes. An area to the southeast of the 1964 fault rupture, called the Yakataga seismic gap, does pose a threat to generate a great subduction earthquake of magnitude 8.75, and could impact the LNG facility. Thus, Yukon Pacific designed the facility to withstand a major, 1 in 10,000 years, earthquake. The risk of a tsunami to an LNG facility at Anderson Bay was evaluated and it was determined that energy dissipation devices will be required to reduce the peak runup of the wave and FERC concurred with these mitigation measures. However, FERC felt that additional plans and mitigation were required to minimize the effects of damaging waves on the marine terminal facilities and on tankers at berth. In addition, FERC recommended an analysis of rock slope stability and potential effects of snow avalanches on the plant, especially under seismic conditions.

Previous studies for TAPS have identified major seismic zones and fault crossings along the TAPS and locations of earthquakes greater than 5.5 in magnitude that have occurred near the TAPS since start-up. Mapping has been prepared that shows estimated peak ground acceleration and design ground acceleration for the design contingency earthquake used in the TAPS design. These documents showed that greatest risks to proposed gas pipeline facilities from earthquakes will occur at Anderson Bay and in the vicinity of the Denali Fault and McGinnis Fault. A 7.9 magnitude earthquake occurred on the Denali Fault in 2002 about 55 miles west of the pipeline. The TAPS Earthquake Monitoring System performed as designed by initiating automatic shutdown of the pipeline. Eight aboveground vertical support members and other pipeline support/structural features were damaged, but repairs were completed within a month of the earthquake. Two levels of earthquake hazards were considered during design of the TAPS – the design contingency earthquake and design operating earthquake. The design of the TAPS was intended to ensure that no structural collapse or release of oil or hazardous substances will be likely. The TAPS was designed to accommodate permanent ground deformation related to liquefaction, slope movements, or surface-fault offsets that might be triggered by earthquakes. At the three fault crossings, the pipeline was placed aboveground with oversize pipe shows and support beams to accommodate design movements. To accommodate large design movements of 20-feet horizontal slip and 5-feet vertical slip at the Denali Fault crossing, the pipeline was placed on beams embedded in a gravel berm. For belowground segments of pipeline, areas that have potential slope instabilities or liquefaction-susceptible soils were identified and the pipeline was routed to avoid those areas to the extent possible.

5.4.2 Information Gaps

The proposed Project LNG facility must meet the minimum siting and design requirements of U.S. Department of Transportation regulations in 49 Code of Federal Regulations (CFR) 193.2061: Seismic Investigation and Design Forces. A comprehensive study of the historical seismicity and evaluation of the site and surrounding regions is required to quantify the effects on the LNG facility from earthquakes and earthquake-related phenomena. Previous studies in support of TAPS and TAGS provide information on the risks for earthquake-induced damage to the proposed pipeline route and for facilities on the North

Slope, along the ROW, and at Anderson Bay. Site-specific information will be needed to identify potential areas where permanent ground deformation related to liquefaction, slope movements, or surface-fault offsets could occur that might be triggered by earthquakes.

5.4.3 *Information and Studies Needed to Fill Data Gaps*

The location of active faults along the proposed pipeline route will have to be confirmed to identify areas where special pipeline engineering is required to minimize the chances for excessive pipeline deformation due to seismic shaking or surface faulting. Studies will need to be conducted to identify potentially liquefiable areas or, areas where alignment changes are not feasible, and to develop construction techniques to mitigate potential liquefaction-related problems. The TAPS was designed to accommodate permanent ground deformation related to liquefaction, slope movements, or surface-fault offsets that might be triggered by earthquakes. At the three fault crossings, the pipeline was placed aboveground with oversize pipe shows and support beams to accommodate design movements. To accommodate large design movements at the Denali Fault crossing, the pipeline was placed on beams embedded in a gravel berm. For belowground segments of pipeline, areas that have potential slope instabilities or liquefaction-susceptible soils were identified and the pipeline was routed to avoid those areas to the extent possible. Similar or better design features will have to be identified during preliminary and FEED to minimize the risks of gas pipeline facility failure in the event of an earthquake, especially in areas where risks of facility failure are greatest (major faults, on or adjacent to steep slopes, and in the area of Anderson Bay).

5.5 Paleontology

Paleontological resources are any physical evidence of past life, including fossilized remains, imprints, and traces of plants and animals. Considerable portions of the Project ROW are underlain by sedimentary rocks or prehistoric soils. As a result, the ROW corridor contains a wide variety of plant and animal fossils. These fossils document nonhuman life in Alaska during the last 570 million years. Paleontological resources (plant and animal fossils) are nonrenewable. Once they are impacted or displaced from their natural context, the damage is irreparable.

5.5.1 Existing Information

Eleven registered paleontological sites occur within a quarter mile of the TAPS ROW and associated materials sites. The North Slope is particularly rich in fossil remains. Most of these fossils on the North Slope (and Brooks Range) are of marine invertebrates, but dinosaur fossils have been found along the Colville River several miles west of the TAPS ROW. The oldest fossil from that area is a tooth plate from a vertebrate fish found in a Middle Devonian rock formation from 380 million years ago. South of the Brooks Range, pre-Quaternary fossils are either absent or less common. Pleistocene fossils are found in many locations along the pipeline, including insects and other invertebrates, and large extinct mammals, such as mammoth, mastodon, bison, horse, muskox and birds.

Discoveries of paleontological resources are reported to the Alaska Department of Natural Resources (ADNR). Pleistocene vertebrate remains were found north of the Yukon River during construction of TAPS, but no major bone beds were found, and there have been no significant discoveries or impacts to paleontological resources on the TAPS ROW. Construction of a natural gas pipeline near TAPS will likely lead to discovery of more sites with fossils, and increase the potential for humans to disturb or collect fossil resources; these impacts could accumulate with past and future fossil disturbance and loss.

5.5.2 Information Gaps

Fossils of scientific value are protected by the Antiquities Act of 1906. Fossils on Federal lands are protected by the Federal Land Policy and Management Act of 1976. Two other Federal laws, the Archaeological Resources Protection Act of 1979 and Federal Cave Resources Protection Act of 1988, protect fossils in archaeological context and fossils from significant caves. Paleontological resources are protected in Alaska under the State's Alaska Historic Preservation Act.

A number of paleontological sites have been found along the TAPS ROW, but information on fossil sites will be limited for areas away from the TAPS ROW that might be impacted by the proposed natural gas pipeline. Surveys will need to be conducted of newly-disturbed sites. Information on paleontological resources will also be needed to assess impacts and develop BMPs and mitigation needed for FERC licensing and the Project's NEPA review.

5.5.3 Information and Studies Needed to Fill Data Gaps

Discussions should be held early during Year 1 with State or Federal agencies to determine if they require paleontological surveys prior to any ground-disturbing activity. Cultural and paleontological resource-use permits will be required from the BLM for survey and excavation on Federal lands prior to conducting surveys; a similar permit will be required from ADNR for surveys on State lands. If surveys of areas likely to contain fossil remains are needed, they will be conducted during Years 2 and 3. If paleontological material is discovered during construction, all operations will be suspended until written authorization to proceed was issued by the appropriate authority. Mitigation for fossil remains will be on a *case-by-case basis.*

5.6 Water Resources

Water resource issues cover the use, protection, habitat values and engineering of wastewater and storm water runoff treatment and river crossings for the Project. Water extraction for consumptive use at temporary facilities during construction, for pipeline and equipment testing, and for permanent facilities such as compressor stations should be straightforward with ADNR and ADEC oversight.

A detailed plan for hydrotesting will be developed during FEED, which will include environmentally acceptable methods of disposal of hydrotesting water. Where practicable, water will be passed from section to section of the pipeline and reused rather than being discarded after each section test. Detailed methods for eventual disposal will also be developed with a view to avoiding environmental contamination. The Owner will also need to obtain a hydrostatic testing water discharge permit from ADEC.

Storm water runoff management and cleanup from disturbed soils and vehicle access areas will require much more effort. Storm Water Pollution Prevention Plans (SWPPPs) and Erosion and Sedimentation Control Plans (ESCPs) will need to be developed in conjunction with design efforts to satisfy USEPA requirements. BMPs will need to focus on controlling runoff and sediments in the spring during break up. As much of the construction will occur in the winter, the following spring will be a critical time to manage impacts.

Another concern will be the potential for establishment of invasive plant species. Hay and straw are known vehicles for invasive plant seed dispersal. All storm water management plans need to eliminate their use and consider other BMPs. Invasive plants can also be carried in soil on construction equipment. Moving equipment between job sites require washing the dirt off to avoid transport of undesirable plant materials. This is standard practice for the logging industry in Alaska. Rain is most intense in all areas in the fall and will require careful stabilization of the ROW following the summer construction work. Plants grow slowly in almost all the construction areas, so storm water will need to be controlled with structural methods until the site is revegetated.

The marine waters of the Anderson Bay Valdez area are subject to ADEC and USEPA, and possibly U.S. Coast Guard oversight of storm water discharge. Treatment facilities may be required for ordinary and snow melt runoff, but with extensive snow management to keep the snow clean, it may be possible to be disposed in an area without treatment.

Water quality issues will be linked to fish and marine mammal habitat. The following is a list of the environmental approvals, authorizations, clearances, and reviews that could be required for a coastal development project in Valdez.

Under the Federal Coastal Zone Management Act and Alaska coastal zone regulations, the project will be required to be consistent with the State and the City of Valdez coastal management plans. Under Section

10 of the Rivers and Harbors Act construction, excavation, or deposition of materials into Valdez Narrows (navigable water of the United States) will have to be approved by the U.S. Army Corps of Engineers (USACE). Consultation required by Section 7 of the Endangered Species Act (ESA) with the U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) will be performed for coastal work that could affect species formally listed as threatened or endangered, including Steller sea lions and humpback whales. The Marine Mammal Protection Act established a moratorium, with certain exceptions, on the taking of marine mammals; consultation regarding project impacts on marine mammals will be required.

Consultation with National Marine Fisheries Service regarding the project's impacts on Essential Fish Habitat (EFH) will be required by the Magnuson-Stevens Fishery and Conservation and Management Act. Under Section 401 of the Clean Water Act, in order to discharge into Valdez Narrows, whether it is fill material or marine vessel ballast, it is necessary that one request and receive a State Certificate of Reasonable Assurance that the discharge will not violate State and Federal water quality standards. The endangered species consultation process is more fully described in Section 6.1 of this Application.

5.6.1 Existing Information

The water resource inventory has been well established in the TAPS corridor by the U.S. Geological Survey (USGS), and dates back to the time of TAPS implementation.

USGS mapping is available for the entire project and will be used to delineate drainage basins and basin characteristics necessary to determine peak flows needed for scour analysis. Peak flows and regulatory flows for fish passage will be determined from existing USGS regression equations. This method is standard practice and is accepted by agencies in Alaska. Collection of flow data is not seen as useful as short-term data are typically not as reliable as information derived from long-term data.

Stream Crossings

Stream crossings are a challenging and visible component of the pipeline route. There are approximately 850 river and stream crossings along the pipeline route and an unknown number of crossings for access roads. Each of these crossings will require some level of review and some will require site specific design. Design and permitting issues will include scour depth and protection, construction timing and methods, heat transfer, stream bank restoration, habitat protection and restoration, and water quality.

Data requirements for these design and permitting issues will include flow peaks and timing, assessment of stream morphology, geotechnical constraints, evaluation of fish habitat for anadromous and resident populations, topography, riparian vegetation and existing stream bank composition. Assessment of stream morphology coupled with fish habitat are perhaps the most important, as they will allow an organized method to classify streams into categories that can be treated similarly. Coupling these will provide a consistent frame of reference that the Project can use for communicating among a variety of disciplines and interested parties, including engineers, regulators, and contractors. Morphological data collection includes slope, channel sinuosity, channel shape and pattern, bed material, and sediment supply. Biological data collection includes fish populations, habitat types, habitat use, and riparian vegetation. Stream crossings issues can also be characterized by general geographic zones.

North Slope to Brooks Range

The North Slope streams feature extreme seasonal flow variations with a wide meander belt and are bordered with relatively cold, stable, permafrost soils. Winter construction while flows are lowest will likely alleviate diversion and dewatering related issues, but may have other effects such as disturbance to winter char and grayling concentrations in pools. This geographic zone will present the biggest challenge to stream bank restoration, as the disturbed permafrost at the bank is susceptible to thermal erosion in the high springtime flows, but is not easily stabilized by revegetation.

Brooks Range to Interior

This mountainous area has streams with higher gradients that are generally underlain with granular soils or bedrock. These streams are also highly seasonal like the North Slope and have increased bed load. Crossing of alluvial fans will be an issue especially for access roads as these areas have created maintenance issues for the TAPS project for many years. Fish populations are generally small but can contain both resident grayling and char, with the occasional anadromous population at the lowest elevations.

Interior to Alaska Range

Interior Alaska streams are typically lower gradient, meandering, and underlain with discontinuous, relatively warm permafrost. Over-wintering habitat is a major concern for resident and anadromous fish as stream flows are very low for extended winter periods.

Alaska Range to Chugach Range

The main feature of this zone is the Copper River valley with many anadromous fish streams. Critical issues will be the timing of crossings and provision for fish passage at any access road crossings. These streams can also have major flow variability from glacial melting.

Chugach Range to Valdez

This zone has several difficult challenges. The streams are glacially fed with steep gradients and huge bed loads. The retreating glaciers keep flows high in the summer resulting in road crossings that are extremely difficult to maintain. Erosion is a constant threat. Fish populations use these streams mainly for spawning after cooler fall temperatures slow glacial melt and steams stabilize for the winter.

5.6.2 Information Gaps Specific to this Project

Recent and historic aerial photography of the project corridor will be useful for development of stream morphological characteristics. The chilled pipeline has the potential to freeze groundwater flow providing a barrier to fish spawning and to aggravate aufeis conditions, followed by burst-out and freezing of under-ice flow, and thus depriving recharge to downstream stream segments. Studies and modeling will be used to determine the proper thermal balance for the pipeline to minimize impacts to stream flow by optimizing the depth of burial, the use of insulation, and other mitigating measures. The potential effects of climate change will be taken into consideration when determining the proper thermal balance and location of the pipeline, especially in areas with discontinuous permafrost.

5.6.3 Information and Studies Needed to Fill Data Gaps

Preliminary Stream Morphology Study

To properly site the pipeline alignment, an evaluation of the stream morphology will be done for each crossing. Crossings can then be evaluated based on their basic characteristics. An example of this is to define meander belt widths to understand the potential future locations of a stream. Doing this analysis will reduce the potential for future river migration to threaten the pipeline. This has happened historically to the TAPS pipeline and river bends have required stabilization to stop channel migration that might otherwise jeopardize the pipeline. Avoiding this situation for the gas line is expected to be a significant design consideration, as the Project will require burial in hundreds of streams that the heated oil line crossed in an elevated mode. The agencies are likely to be especially interested in situations where a buried crossing could alter stream flows and induce long-term changes in stream morphology.

TAPS Forensic Engineering Study

Every effort will be made to learn from previous work along the TAPS corridor. Hydrologic engineering relies heavily on maintenance experience of existing features and there is 30 years of experience to draw

from. Early in the first summer of design, a reconnaissance of the TAPS corridor river crossings will be conducted in conjunction with interviewing maintenance personnel to understand how crossings have worked or not worked over time. This information will be used as a basis for selecting the best design solution to apply at specific gas pipeline stream crossings.

Regulatory Agency Demonstration Project

Although British Petroleum has been performing trenching tests on the North Slope, little is known about the performance of reconstructed, disturbed permafrost at stream banks. To gain knowledge and agency concurrence on installation and construction methods, it may be useful to initiate a demonstration stream crossing project on the North Slope before pipeline construction begins. While much is known about repairing stream banks in climates south of the Brook Range, very little information exists about stabilizing streams on the arctic coastal plain. Such a demonstration project would be very useful in developing construction methods for this area and regulatory acceptance of the proposed method.

5.7 Wetlands

Given the great extent of wetlands present in the pipeline corridor from Prudhoe Bay to Valdez, some of the measures laid out in the FERC Wetland and Waterbody Construction and Mitigation Procedures may not be appropriate. Project-specific measures may be more practical and effective, and thus worth negotiating with FERC.

Riparian areas *per se* are not regulated in Alaska.

5.7.1 Existing Information

Existing data are extensive, but the most useful are primarily held by private entities. An effort will be made to acquire these data and thus reduce the amount of field surveys that will otherwise be required for permitting.

5.7.2 Information Gaps

An accurate wetland delineation is needed along the project corridor. Preparing accurate mapping may become a critical-path activity, as the USACE's Section 404 permitting process cannot be initiated without accurate wetland delineations. Information on the types, functions, and values of the affected wetlands is a significant but less well-defined requirement.

The Project will need to mitigate adverse effects on wetlands through avoiding, minimizing, and compensating for unavoidable wetland impacts. Costly compensation can be minimized by thoroughly incorporating all feasible measures to avoid, minimize, and rectify temporary wetland impacts during construction. The Project's wetland team will work closely with the pipeline design and construction engineers to minimize wetland impacts.

Also needed is information on representative wetlands' hydrology, soils, and vegetation to allow development of an effective project-specific wetland restoration plan.

5.7.3 Information and Studies Needed to Fill Data Gaps

The work needed to develop the necessary wetland data is summarized in Addendum 1.

Field wetland determination data must be provided for the entire corridor. What cannot be drawn from existing sources will be developed in 2009 and 2010 field seasons. Based on the site data, accurate maps of wetland boundaries will be developed. The quantity of wetland determination data required to support the mapping will be negotiated with the USACE at the Project outset.

Thorough compilation, review, and evaluation of existing information will minimize the amount of additional data that must be acquired from the field. This is particularly important given the short summer field season, that only two summers are available to complete the work, the relatively limited number of individuals qualified to do the work in Alaska, and the high cost of field investigations.

The team will meet early with the USACE to agree on the type of information that the USACE will need to evaluate the project's effects on wetlands. It is likely the USACE will require some level of quantitative analysis of wetland functions and values and how those will be affected by the project. The team will need to develop a method that is simple and transparent and that can be implemented in one or two field seasons. Use of Geographic Information Systems (GIS) for a landscape-level analysis is likely to be most cost-effective.

The wetland team will work iteractively with project designers from project outset to minimize the project's effects on wetlands. The team will simultaneously develop creative strategies for compensating for wetland losses. The manner in which this need can best be fulfilled will be negotiated with the Corps of Engineers.

The team will perform field investigations to characterize the hydrologic conditions and vegetation of different wetland types so the construction and restoration plans can ensure maintenance of the natural hydrology and revegetation after construction. The team will consider how water reaches, passes through, and leaves the wetlands and interactions between surface and groundwater. This is expected to be done with a GIS-based landscape-level analysis, with ground truthing at representative locations. While vegetation data will be gathered during wetland delineation, field teams will develop specific additional information on the viability of natural revegetation under different construction scenarios and on sites or vegetation types that will need supplemental plantings. The teams will need to identify plant material sources and potential wetland replacement areas if it is not possible to restore or create wetlands near the area of disturbance.

5.8 Vegetation

The Project pipeline ROW will traverse a variety of plant community types, from arctic tundra to coastal Western hemlock-Sitka spruce forests. Clearing of all or part of an 800-mile ROW and sites for the LNG facility, compressor stations, and other facilities associated with the project will impact vegetation within and near the ROW. The primary impact to vegetation will be direct removal during ROW preparation activities such as clearing, grading, and gravel placement. Other important impacts to vegetation will include: an increase in active layer depth through organic layer compaction and canopy removal, making revegetation difficult; alteration of drainage patterns, resulting in mortality of some vegetation and long-term changes in species composition; deposition of dust and eroded materials from the ROW onto vegetation, potentially changing species composition; vegetation mortality from fires, which could result from operation of equipment and flammable materials; changes in soil temperature surrounding the buried pipeline, changing thaw depth, root penetration, and growing season for vegetation; and spills of oil, lubricants, or other contaminants.

5.8.1 Existing Information

Major vegetation zones, including landforms, vegetation types, and dominant species; sensitivity of vegetation communities to fire; vegetation impacts of operation and maintenance of the TAPS ROW; and impacts of spills of oil and other contaminants on vegetation have been described for the TAPS ROW. Impacts to vegetation include loss of vegetation in areas where vegetation and soil are removed during construction or from erosion, or covered with gravel. Dust associated with construction equipment and vehicle traffic will cover and harm vegetation. Even if disturbed sites are revegetated, there is the possibility that sites will be revegetated with invasive species. No plants listed as threatened or endangered in Alaska occur along the TAPS pipeline and adjacent areas.

Much of the information on vegetation classes is applicable to the Project pipeline, at least at a coarse scale, because the Project pipeline is close enough to TAPS to pass through the same vegetation types. Information on vegetation impacts is less applicable because of the different designs of the pipelines (above-ground versus below-ground) and construction practices. Site-specific impacts to vegetation will be determined during FEED and construction.

The proposed Anderson Bay LNG site is covered by mature coastal spruce and hemlock forest (83% of site), with scattered shrublands (4%) and wetlands (13%) on the site. Many of the larger trees are 36 inches diameter at breast height or larger.

5.8.2 Information Gaps

Information on vegetation is needed to assess impacts and develops BMPs and mitigation needed for FERC licensing, to support the study plan requirements for State (AS 38.35.050) to prepare a timber removal permit (ADNR), and to prepare the NEPA EIS. Much of this information will be available from existing databases and studies. However, site-specific studies may be beneficial to identify SOPs and mitigation measures to protect more important vegetation communities and to maintain vegetation to reduce soil erosion.

5.8.3 Information and Studies Needed to Fill Data Gaps

Because direct removal of vegetation is the primary impact of the Project pipeline, characterizing that impact will require an estimate of the area that will be cleared, graded, or otherwise altered for site preparation for the ROW, LNG facility access roads and construction pads and laydown areas, and other project facilities. Vegetation helps to bind soil and removal of vegetation increases the risk of erosion, which could become an issue in areas with steep slopes or near streams and rivers. In addition, construction activities, including routine traffic, will generate dust at construction sites and along access roads that could harm or kill nearby vegetation. An assessment of vegetation condition at these critical areas along the pipeline route and at the LNG facility will help in siting facilities and developing BMPs to minimize impacts to vegetation and soil and to identify suitable revegetation measures.

Based on the schedule developed for this proposal, desk studies to identify areas of concern will be done in 2008 to assist with pre-FEED and preliminary siting of facilities. Field and laboratory studies may be required during 2009 and 2010 to determine final pipeline routing and location of facility footprints, and to develop BMPs and mitigation measures. Revegetation will be designed to occur sequentially as construction is completed at each pipeline spread or other project sites. Monitoring will be required during construction and operation to ensure that revegetation was successful and to identify areas where vegetation is being lost due to erosion and other project-related factors. Clearing and restoration plans will be prepared in support of the ROW lease applications.

5.9 Freshwater and Marine Fish and Marine Benthic Organisms

The Project has the potential to impact fish and other aquatic organisms via alteration and loss of aquatic habitat, obstructions to fish passage, spills, and increased human access. The Project pipeline will cross more than 800 streams, over 200 of which are known to support fish. Five species of salmon occur in Port Valdez and numerous salmon spawning streams flow into Port Valdez. Pacific herring is another economically important resource in Port Valdez. Major issues of concern for fish include sedimentation, turbidity, increased water temperature, stream diversion and blockage, drainage of water bodies, removal of riparian vegetation, destruction of overwintering habitat, discharge of contaminants to water, and overharvesting of fish stocks. In addition, marine mammals in the Beaufort Sea and Prince William Sound at the north and south ends of the pipeline, respectively, could be impacted by pipeline-related factors such as boat traffic, noise, and oil spills. There is also the potential for the introduction of invasive species associated with the discharge of ballast water from LNG transport vessels.

5.9.1 Existing Information

A large amount of information regarding fish species along the pipeline route and impacts to these species exists in the form of environmental impact statements, documents and databases from Federal and State agencies, and academic studies, although some of this information is likely not current enough to be useful.

Information is available on fish species, aquatic habitats, and fisheries harvest within each of the major drainages crossed by the TAGS ROW. This includes a listing 104 of the most productive streams crossed

by the proposed TAGS, the fish species present in each stream, and critical times of year when these species are most sensitive to environmental disturbance as determined by the BLM. Gravel removal and other construction activities in streams during fall freeze-up, siltation caused by gravel removal, and water withdrawal would be the primary impacts to fish associated with the gas condition plant construction. The EIS prepared for the TAGS LNG discussed fish surveys in the Port Valdez area, important spawning time for anadromous species, and listed sensitive whale and marine mammal species in the Beaufort Sea and Prince William Sound. Cumulative effects to fish included loss of fish habitat, impacts to stream flow, stream sedimentation, and increases in fishing pressure.

More in-depth and detailed information has been collected along the TAPS ROW, including:

- A description of fish species, their life history, range and dispersal, and aquatic habitats in five regions of Alaska (North Slope Region, Interior Alaskan Region, South of the Alaska Range, Beaufort Sea, and Prince William Sound) crossed by the TAPS ROW
- A list of streams crossed by the TAPS ROW, including fish presence and sensitivity by month
- A discussion of whale and other marine mammal species of concern that could be affected by TAPS, including life histories and seasonal distributions
- A detailed discussion of impacts of habitat loss/alteration, obstruction of fish passage, and increased human access
- Cumulative effects from construction of a gas pipeline in association with the TAPS

The *Catalog of Waters Important for Spawning, Rearing or Migration of Anadromous Fisheries* lists Alaskan water bodies documented as used by anadromous fish and maps extent of fish use of each water body. The catalog is maintained by the ADF&G as part of its Fish Distribution Database. The ADF&G also provides information on fish species of concern found in Alaska. The BLM and Alyeska Pipeline Service Company also maintain fish databases containing information on species and habitats in the TAPS ROW and conduct surveys along the ROW to identify potential obstructions. The BLM's database identifies key fish and wildlife areas and sensitive habitat on Federally-administered lands and classifies waterbodies along the ROW as not sensitive, sensitive, or critically sensitive based on the spawning, migration, and rearing activities of important fish species along the ROW. Numerous fish studies associated with North Slope oil and gas development also provide information on fish resources and potential impacts to fish from the pipeline.

Five species of salmon occur in Port Valdez. Pink and chum salmon are the only salmon species known to spawn in streams at the proposed Anderson Bay project site. Pacific herring also spawn near Anderson Bay, but kelp, an important spawning habitat, is not abundant. Other marine fish and shellfish are found in the area, but are not common. The project may have impacts on several streams in the area, and pink and chum salmon.

The benthic community in Anderson Bay is characterized by a patchy distribution and relatively low species diversity. Rockweed and mussels dominate the intertidal zone, and red algae in the mid- and low-intertidal zones. Several eelgrass beds are found in Anderson Bay. The infauna of Anderson Bay is dominated by polychaete works with bivalve mollusks and arthropod crustaceans. Several long-term monitoring studies of benthic fauna have occurred in Port Valdez since the early 1990s.

5.9.2 Information Gaps

There is a wealth of information regarding fish and their use of habitats within the TAPS ROW, but information on fish use for portions of water bodies outside of the TAPS ROW (including those portions along the Project pipeline route) is unavailable or incomplete. Similarly, most existing information regarding the impacts of pipeline construction and operation on fish is specific to the TAPS ROW and may not necessarily apply to the Project pipeline route.

Construction of a natural gas pipeline and associated infrastructure will require a number of permits. The ADNR requires a Title 41 permit and a Fish Habitat Permit for all activities in or near fish streams that

could affect anadromous fish and their habitat or the free and efficient migrations of resident fish. A USACE Section 404 (Clean Water Act) and ADEC Section 401 permit will be required for discharges of dredged and fill material into and construction in wetlands and streams. A USACE National Pollution Discharge Elimination System (NPDES) permit will be required for wastewater and other discharges, including those to water bodies. The applicant will need to obtain a hydrostatic testing water discharge permit from ADEC for discharges of water used to test the pipeline and equipment. A USACE Section 10 permit will be required for structures or work in or affecting navigable waters, including a structure to carry the Project pipeline over the Yukon River or other large rivers. An ADNR Temporary Water Use Permit is required for uses of significant amounts of surface or ground water for less than 5 years. An ADF&G Special Area Permit will be required for activities in State sanctuaries, refuges, and critical habitats. Fish and Wildlife Coordination Act reviews will be required for placement of fill in waters of the U.S. Site-specific information, in addition to information from Federal, State, and local databases and previous reports, will be required to: (1) complete these applications; (2) assess impacts and develop BMPs and mitigation needed for FERC licensing; (3) support the study plan requirements for State (AS 38.35.050) and Federal pipeline ROW lease applications; (4), prepare the NEPA EIS; and (5) site the pipeline, LNG terminal, and other project facilities to minimize impacts to the fish resources.

Because construction of a pipeline may involve impacts to fish and other aquatic species of concern, several legislative acts that mandate aquatic species protection are relevant. The ESA requires the protection of species in danger of extinction and their habitats. There are no endangered or threatened fish species known to exist along the pipeline route, but endangered and threatened marine mammals are found in the Beaufort Sea and Prince William Sound near the north and south terminus of the pipeline route. The ADF&G maintains a list of State sensitive species in addition to species Federally-listed under the ESA; no State sensitive fish species are known to exist along the pipeline route, but the fall run of the Snake River Chinook salmon, which may be found near Valdez, is considered a sensitive species by the ADF&G. Several other Federally-listed Pacific salmon are also found near Prince William Sound and along tanker routes to the Pacific Coast. The Magnuson-Stevens Fishery Conservation and Management Act of 1996 mandates the description and identification of EFH in fishery management plans. The Marine Mammal Protection Act prohibits the take of marine mammals in U.S. waters and by U.S. citizens on the high seas.

Efforts to date to identify EFH along the Project pipeline ROW are incomplete, but essential to meeting the requirements of the Magnuson-Stevens Act. Further information is needed on special status marine mammal species in the Beaufort Sea and Prince William Sound that may be affected by pipeline, LNG terminal activities and shipping. Surveys for special status species in habitats along the Project pipeline ROW may not be recent enough to meet requirements for environmental due diligence.

Winter is a season of particularly high mortality for fish species in streams. Pipeline construction can threaten overwintering fish through loss of surface flow, entrapment, and prevention of dispersal. Existing information sources identify these threats but do not discuss them in sufficient detail, and further study is needed to adequately understand and characterize these threats. Pink salmon and other fish are especially susceptible to oil spills and other contaminants at the Valdez Marine Terminal and from tanker traffic in Prince William Sound.

Fish spawning habitat could be impacted by siltation of creeks from erosion associated with construction activities, loss of riparian vegetation, from spills, and from water withdrawals needed for plant operations. Best management practices to address these concerns were provided in general terms in the TAGS, TAPS Renewal, and LNG EISs; more detailed information will be required for the Project.

The bulk of information on aquatic organisms in or near the Project pipeline ROW relates to anadromous fish species, primarily because of the importance of these species to Alaska's economy. Other groups of species that are less economically important but nonetheless play critical ecological roles, particularly invertebrate species, are underrepresented in existing information.

Lastly, information contained in many of the sources described in the previous section is greater than 10 years old and may not represent the current status of fish and aquatic organisms along the pipeline route. There is a need for updated information.

5.9.3 Information and Studies Needed to Fill Data Gaps

Existing databases should be reviewed and consultations held with agencies and organizations responsible for fish management in Alaska to identify waterbodies impacted by the project that may have EFH and other high importance fish habitat (e.g., spawning and overwintering habitat), or use by anadromous fish. Site assessments should be conducted for newly-disturbed water bodies to assess impacts to fish and their habitats, including spawning and wintering habitats that could be impacted by construction activities along the pipeline ROW and at Anderson Bay. These include effects associated with spills, erosion and sedimentation, mass wasting, frost heave, and ice blockage associated with an underground pipeline. Studies should be conducted to determine the appropriate stream crossing method (open trench, dam-and-pump, fluming, or horizontal directional drilling), and appropriate time of year for crossing the stream (summer, winter, or year-round). A thorough subsurface investigation is recommended for each crossing site to identify subsurface conditions that may pose potential problems for trenching and boring activities. The investigation should also identify the amount of bedding material required at each site. Studies should also focus on pipeline placement over major rivers, such as the Yukon, Tanana, Gulkana, and Tazlina. In addition, impacts to marine birds and seabird colonies from activities at Anderson Bay and along shipping routes in Prince William Sound/North Gulf of Alaska should be assessed.

Because the proposed LNG facility operation required water withdrawal from nearby streams, the ADF&G recommended that Yukon Pacific conduct an in-stream flow study to determine minimum flow requirements to support resident anadromous fish

Requests will be made to the USFWS and NMFS for lists of threatened and endangered species, and *species proposed for listing, that could be found near the Project. After receipt of these requests, the* applicant will initiate informal consultation with the Services. These activities will occur during Year 1. If, after preparation of a Biological Assessment by the Federal lead agency, it is determined that the pipeline project may adversely affect threatened or endangered species or their critical habitat, the applicant and Federal lead agency will initiate formal consultation with the Services.

These efforts will be conducted during spring through fall of Year 1, with marine and benthic studies occurring during the winter of Year 2, once the pipeline, LNG facility, and other project facility locations are better defined to assess impacts and develop BMPS to minimize impacts to fish and other aquatic organisms. Scientific collection permits may be required for studies that might result in the harassment or the need to collect fish or other aquatic organisms. Ongoing monitoring will be required to ensure that streams are not affected by erosion, culvert blockages, frost heave, ice blockage, or spills.

5.10 Wildlife

Wildlife along the Project pipeline ROW could be impacted via changes in habitat quality, disturbance and displacement, injury and mortality, and obstruction to movement. There are 481 bird species in Alaska, including many migratory species that likely inhabit parts of the pipeline ROW at some point during the year. Over 200 species of birds are found in Prince William Sound, and as many as 2 million seabirds may summer in the North Gulf of Alaska/Prince William Sound region. Over 100 mammal species occur in Alaska, many of which are known to exist along the pipeline ROW and in Prince William Sound. Four Federally-listed endangered (Eskimo curlew, humpback whale, fin whale, and bowhead whale), three Federally-listed threatened (Steller's eider, spectacled eider, and Steller sea lion), one Federal proposed (polar bear) and 10 State-listed sensitive species could be found near the Project, pipeline ROW, or LNG facility or along marine travel routes. Several other Federally-listed whale species could be found in the Beaufort Sea and/or Prince William Sound. Major issues of concern for wildlife species include direct mortality (vehicle collisions, shooting, stress from deliberate harassment), disturbance through human activity (noise, traffic, etc.), habitat loss through displacement and physical alteration, disturbance during critical seasons, attraction to artificial food sources (causing habituation and disruption of foraging behavior), contamination of food by pollutants, disruption of migratory movements (particularly during the open ditch stage of construction), and changes in predator populations.

5.10.1 Existing Information

A large amount of information regarding wildlife species found along the pipeline route and impacts to these species exists in the form of environmental impact statements, documents and databases from Federal and State agencies, and academic studies, although some of this information is likely not current enough to be useful.

Studies in support of the TAGS inventoried wildlife species found in each major drainage along the pipeline route, and provided a general overview of threats to mammal and bird species, with greater detail for special status species, and responses of these species to threats. Information was provided on critical habitat areas and periods of use for raptors and waterfowl, as well as sensitive areas for mammals along the TAGS ROW. Detailed information on caribou herds in Alaska and their range and dispersal was also presented.

Extensive information on wildlife and their habitats has been collected along the TAPS. This includes:

- a list of birds found along the ROW, on the North Slope, and in Prince William Sound
- descriptions of classes of birds in Alaska and their ranges and habitats along the TAPS ROW
- harvest summaries by Game Management Unit for 2000-2001 of mammals along the ROW
- distributions and population estimates of Alaskan caribou herds
- a description of terrestrial mammals found along the ROW, including life history, distribution, population estimates, and mortality factors
- a description of marine mammals found on the North Slope/Beaufort Sea, including life history, distribution, population estimates, and mortality factors
- a list of special status species potentially found along the ROW
- detailed descriptions of three Federally-listed bird species found along ROW (spectacled eider, Steller's eider, Eskimo curlew) and two recovered species still undergoing monitoring (Arctic and American peregrine falcons)
- detailed descriptions of State-sensitive species
- an assessment of cumulative effects

Numerous academic studies of wildlife impacts associated with North Slope oil fields and the pipeline exist. The ADF&G conducts annual survey/inventory reports of important wildlife populations in Game Management Units. Alyeska Security helicopter flights (primarily from 1991-1996) provide records of terrestrial mammal observations along the ROW, primarily between Milepost (MP) 150 and 800. Topics that are particularly well represented in the literature include habituation of terrestrial mammals to human activities, impacts of vehicle and aircraft disturbances on wildlife use along the pipeline, and obstruction of wildlife movements caused by the pipeline.

Use of Prince William Sound by wildlife, especially waterbirds, is primarily related to food availability and that peak use of terrestrial habitats occurs during the summer breeding season (May to August) and during spring (March to May) and fall (August to October) migration periods. The Copper River Delta, 80 miles southeast of Port Valdez, is the staging ground for millions of waterfowl and shorebirds. The American and Arctic peregrine falcons may be found near Anderson Bay. Sea otters (State sensitive) and harbor seals are the most common marine mammals found in Port Valdez. Steller sea lions (Federal threatened) occasionally occur within Valdez Arm and several rookeries and haulouts in Prince William Sound, including 10 sites near the mouth of Valdez Arm, have been designated as critical habitat. Critical habitat at each location extends out 20 nautical miles seaward from the shoreline. Humpback whale and finback whale (Federal and State endangered) and gray whale may be found in Valdez Arm.

5.10.2 Information Gaps

Because construction of a pipeline, LNG plant and marine terminal, and associated facilities may involve impacts to wildlife species of concern, several legislative acts that mandate wildlife protection are relevant. The ESA requires the protection of species in danger of extinction and their habitats. Two Federally-listed threatened species (spectacled eider and Steller's eider) are known to occur or could potentially occur along the Project pipeline ROW. Several Federally-listed endangered or threatened marine mammals are found in the Beaufort Sea and/or Prince William Sound, including the bowhead whale and Steller sea lion. Historically, Federally-listed endangered Eskimo curlews were found in central Alaska and easterly into Canada. However, it is unlikely that the Eskimo curlew will be found near the Project as the last sighting of an Eskimo curlew was in Texas in 1962. The ADF&G maintains a list of State sensitive species in addition to species Federally-listed under the ESA. State species of concern that could occur along the ROW include American peregrine falcon, Arctic peregrine falcon, olive-sided flycatcher, gray-cheeked thrush, Townsend's warbler, and blackpoll warbler. Site-specific information, in addition to information from Federal, State, and local databases and reports, will be obtained to undertake consultation with the USFWS and NMFS for Federally-listed species, to assess impacts and develops BMPs and mitigation needed for FERC licensing and the NEPA EIS, to prepare a Wildlife (human/carnivore) Interaction Plan as part of the State ROW ease application, and to site the pipeline, LNG terminal, and other project facilities to minimize impacts to the wildlife resource.

Other relevant wildlife laws include the Bald and Golden Eagle Protection Act, which prohibits the possession, taking, and commerce of bald or golden eagles; the Marine Mammal Protection Act, which prohibits the take of marine mammals in U.S. waters and by U.S. citizens on the high seas; and the Migratory Bird Treaty Act, which prohibits the taking, killing, or possessing of migratory birds.

The majority of existing information is specific to TAPS, which runs parallel and in close proximity to the Project pipeline ROW. However, TAPS is an above-ground pipeline, while the Project pipeline will be buried. This is a significant difference to wildlife species that will be reflected in different impacts from TAPS versus the AIP pipeline. Information dealing specifically with impacts from a buried pipeline is lacking. Additionally, information on the cumulative effects of TAPS and the Project pipeline is unavailable.

5.10.3 Information and Studies Needed to Fill Data Gaps

Existing databases will be reviewed and consultations held with agencies and organizations responsible for wildlife management in Alaska to identify important wildlife species and their habitats that could be impacted by the project. Requests will be made to the USFWS and NMFS for lists of threatened and endangered species, and species proposed for listing, that could be found near the Project. After receipt of these requests, the applicant will initiate informal consultation with the Services. These activities will occur during Year 1. If, after preparation of a Biological Assessment by the Federal lead agency, it is determined that the pipeline project may adversely affect threatened or endangered species or their critical habitat, the applicant and Federal lead agency will initiate formal consultation with the Services.

Surveys for occurrence and habitat use of sensitive and other important wildlife species (waterfowl, caribou, brown and black bear, moose, mountain goat, Dall sheep), their habitats, and areas of high concentrations along the Project pipeline ROW and at the LNG facility and marine terminal will be conducted to update species occurrence data. Surveys will be conducted prior to construction, and in areas and during times of the year when species are most likely to be found in the vicinity of the Project. For example, spring and/or summer surveys of spectacled eider and Steller's eider will be conducted between MP 0 and 12 of the Project pipeline ROW, based on previous surveys of the species. Nineteen species of raptors are found along the TAPS ROW and surveys for raptor nests, including a bald eagle nest survey, will be conducted along cliffs and bluffs, and in areas with suitable nesting trees, during the breeding season. The Project Execution Plan assumes that a considerable amount of blasting (explosives) will be utilized for trenching and grade preparation. Thus, studies will focus on these areas where short-term disturbances to wildlife could be substantial. A Migratory Bird Protection Plan will be prepared to protect migratory birds. Blasting and construction plans will also need to recognize

geographic and seasonal exclusion zones around sensitive wildlife areas, such as nesting and breeding areas, and critical life history stages.

These surveys will be important in siting of project facilities, these studies will be initiated during Year 2. Subsequent surveys may be required during pipeline and facility construction to minimize impacts to wildlife, and monitoring will be required during operation to assess the effects of the project on wildlife. In addition, biologists will provide guidance to construction and operations staff on the need to time activities in areas with concentrations of wildlife, or wildlife species of concern, during important life periods, such as breeding or migration, to minimize impacts to wildlife. Ongoing training will be provided to construction and operations staff to ensure that they take measures to avoid activities that attract predators and nuisance wildlife and that minimize vehicle collisions with wildlife.

The potential for bear-human conflicts is a concern. The proposed LNG plant could impact bear foraging areas and travel routes. Bear-human interactions are also likely along much of the pipeline ROW. Prior to beginning operations, the applicant will consult with Federal, State, and local bear biologists to develop a plan to minimize human-bear conflicts.

5.11 Cultural Resources

5.11.1 Existing Information

Cultural resources are sites, districts, structures, buildings and objects that have significance in prehistory or history. Under the guidelines of the National Historic Preservation Act (NHPA, 1966; 36 CFR 800), prehistoric or historic sites ("historic properties") are those that are listed in, or are eligible for inclusion in, the National Register of Historic Places (NRHP). For a site to be considered "historic," it must be more than 50 years old, unless it has exceptional national, state, or local significance. Specific locations may also hold significance for contemporary Alaska Natives as sacred sites and traditional cultural properties.

Information on the ROW exists in a variety of sources. The Alaska Heritage Resource Survey (AHRS) is a confidential Statewide database maintained by the ADNR Office of History and Archaeology in Anchorage. The NRHP, maintained by the National Park Service, provides a listing of sites listed in the NRHP. Site information exists in the Bureau of Indian Affairs Native Allotments and 14(H)1 historic and cemetery sites data files, as well as files of the Tanana Chief's Conference, the North Slope Borough, and the Fairbanks North Star Borough. The TAPS cultural resources surveys (1969-1975) generated many reports, as did the Alaska Natural Gas Transportation System (ANGTS) cultural resources surveys (1978-1981). The TAGS EIS provides a general overview of cultural resources, while the Yukon Pacific Corporation LNG Project EIS had as a main focus the LNG facility at Anderson Bay. The TAPS ROW Renewal EIS and supporting documents provide a useful overview and analysis of cultural resources along the TAPS corridor. Data collected and summarized by Northern Land Use Research (NLUR) for the TAPS Owners Environmental Report provides a comprehensive analysis of site information along the TAPS route as of 1999-2000. In 2001, NLUR conducted extensive data analysis and surveys for the Alaska Gas Producer's Pipeline Team (AGPPT; comprised of ConocoPhillips, BP, and Exxon). Three major proprietary reports prepared by NLUR/Chumis include a comprehensive data review and assessment of a proposed gas line route from Prudhoe Bay to the Canadian border as well as a predictive model/research design to guide field surveys. Phase I field survey of ~625 miles was completed for one specific alignment. In addition to the above sources, primary and secondary data lie in the archaeological, ethnographic and historical literature for Alaska, as well as numerous archival sources (e.g., mining records, land status files, University of Alaska Fairbanks archives).

Alaska's prehistory is still poorly understood, but research during the past three decades along the TAPS route, in North Slope oil and gas exploration and development areas, and in Prince William Sound has made significant contributions to our knowledge. In the study area, cultural resources of widespread ages are found in varied environmental settings and are represented by a remarkable diversity of site types. The study area is known to contain more than 1,000 sites. Sites are geographically concentrated in a number of areas, reflecting both intensity of research and natural resources. Native allotments lie within or adjacent to the pipeline ROW; in addition, there are Native historic and cemetery sites selected by

Native corporations under Section 14(h)1 of Alaska Native Claims Settlement Act. Project area cultural resources vary with respect to legal status; at least one site is a National Historic Landmark and a number of properties are listed on the NRHP. There are several archaeological districts adjacent to the study area.

Prehistoric sites in the general study area include lithic chipping stations, hunting lookouts, campsites, villages, house pits and tent rings, caches, caribou drive fence, quarry sites, pictographs, and rock shelters. Within several miles of the ROW lies the oldest documented site in Alaska, which is among the oldest (circa 14,000 years) known sites in the New World. Multi-component and/or stratified sites are relatively uncommon. Most of the known sites are surficial or shallowly buried because environmental factors do not permit burial through the accumulation of sediment over extended periods of time. Historic sites include the Prudhoe Bay discovery well recently nominated to the NRHP, Alaska Native traditional land-use sites, roadhouses, cabins, homesteads, telegraph line stations, trading posts, grave sites and cemeteries, a shipwrecked steamboat, World War II and Cold War military sites, historic trails, gold rush towns, gold mining sites, gold dredges and associated ditches, railroad related features, aircraft wreckage, and historically significant structures such as bridges.

5.11.2 Information Gaps Specific to this Project

Because of the site specific nature of cultural resources, any new pipeline alignment or addition of new ancillary facilities will quite likely require a field survey of the specific area in question. A lateral movement of just 100 feet off a previously surveyed alignment will almost certainly trigger an agency request for additional information. For this reason, much of the existing data will not satisfy the requirements of the NHPA Section 106, 36 CFR 800 and FERC cultural resource requirements, nor will existing data suffice for NEPA analysis.

Numerous additional data gaps exist. The AHRS database, although a useful planning tool, is not comprehensive, is incomplete, in many cases not accurate/precise, and in only a few cases has it been field checked. It is not adequate for Section 106 review and in itself not sufficient for characterizing the affected environment in the NEPA process. Previous surveys (TAPS, TAGS, ANGTS and AGPPT) do not necessarily provide coverage of a new Area of Potential Effect (APE). Many data inconsistencies exist among the pre 2001 surveys (e.g., inaccurate (pre Global Position System) site location data). In many cases, earlier methodologies are not adequate for current NHPA and NEPA review.

Assuming a proposed LNG facility location is Anderson Bay Section 106 survey (Hall 1990) is probably adequate and may not need additional fieldwork. Again assuming locations coincide, this may also be true of several areas surveyed in the past by ANGTS and AGPPT archaeologists for proposed gas treatment facilities and compressor stations. It is doubtful, however, that a new pipeline alignment will coincide with previously-surveyed alignments and compressor station pads.

5.11.3 Information and Studies Needed to Fill Data Gaps

In order to satisfy NEPA, Section 106 of NHPA and the FERC cultural resource requirements, a multi-year study program is outlined. This is based on other similar large scale projects and follows a defined and proscribed process (see flowchart in Figure 5.11.1). This process is more fully described in the Regulatory Plan, provided as Section 2.2.4 of this Application.

Year 1

The process begins by initiating the Section 106 and FERC process. This includes defining the undertaking and identifying the likely APE to the State Historic Preservation Office. Beginning in 2008, the project team will develop a field plan, research design, and predictive model. It is anticipated that this will be done as part of the Federal and State antiquity fieldwork permit application package. The research design is especially important to a large project, as it results in an agency approved survey strategy that can drastically reduce the total acreage to be surveyed by stratifying the sample area. Areas of low site potential may be excluded from survey.

Year 2

Early in the process it will be important to identify consulting parties and initiate consultation, and in particular involve Native Alaskan groups. Year 2009 efforts will include "Identification Phase" surveys (as defined by 36 CFR 800 and Alaska SHPO guidelines). Data from these surveys provide the basis for characterizing the affected environment in the Project's EIS or Supplemental EIS. Year 2009 is also expected to see the completion of an Overview/ Survey Report based on Year 1 fieldwork. This report serves as both the SHPO section 106 report and Resource Report No. 4 needed for the FERC filing. The surveys will address the pipeline alignment, as well as materials sources and access roads, to the extent these have been delineated.

The 2009 season will initiate "Evaluation Phase" fieldwork (SHPO Level 2). This is required to determine whether or not sites meet the requirements for inclusion in the National Register of Historic places. A "Plan for Unanticipated Historic Resources and Human Remains" as required by FERC will be developed. Once sites have been identified and evaluated, it will be possible to fully characterize the affected environment for relevant EIS sections. It is also expected that the draft Programmatic Agreement (PA) among FERC, SHPO and interested parties (especially including Native organizations) will be developed in 2009. A PA provides an alternative to the standard Section 106 process (36 CFR 800), that can be tailored to a specific project. Based on 2009 fieldwork, the Project will prepare an Overview/Survey and Evaluation Report.

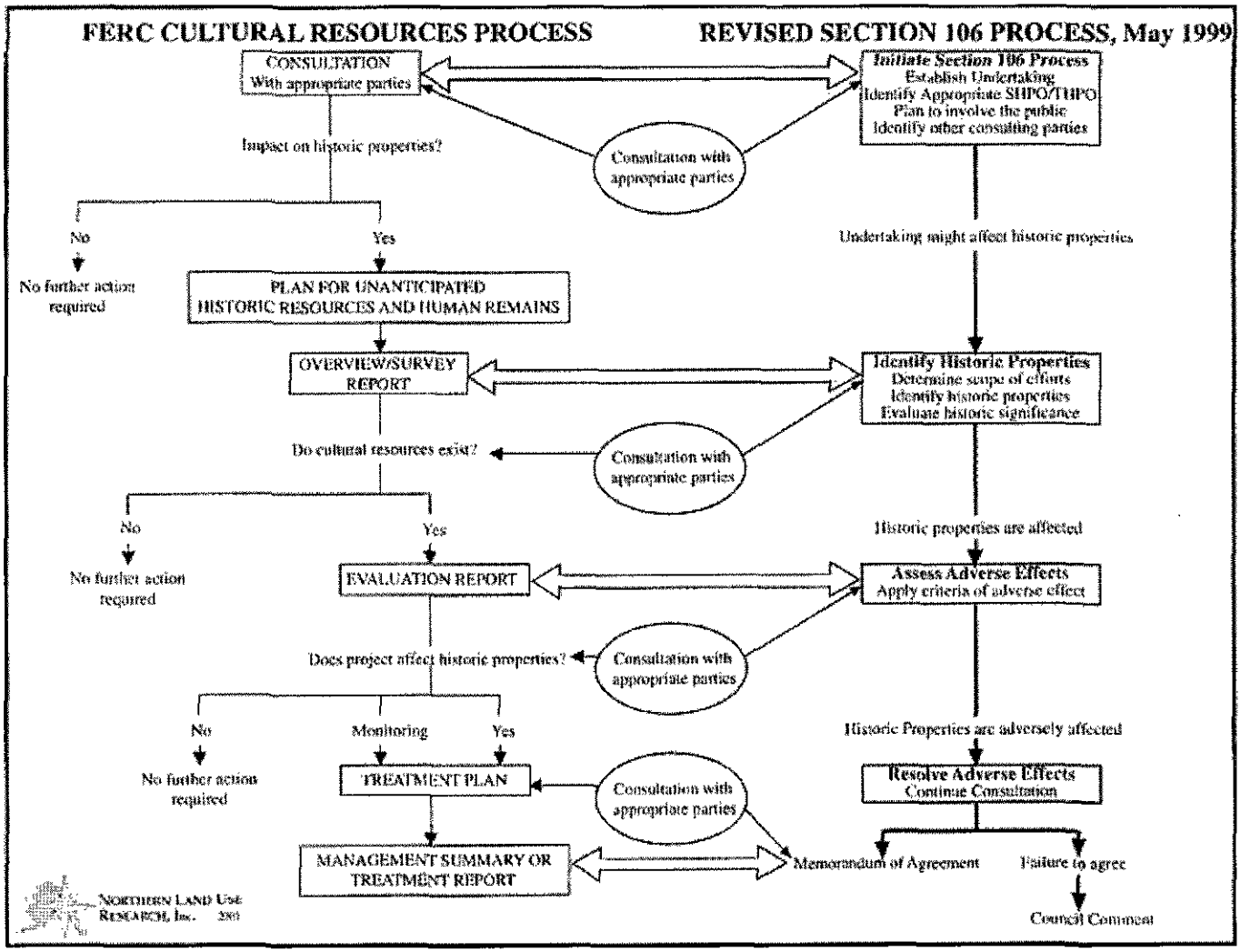
Year 3

In 2010, the Project will continue the consultation process, and continue Identification Phase surveys, especially identification of new alignment revisions, material sources and other previously-unidentified areas as needed. The third season will continue "Evaluation Phase" fieldwork. The PA will likely be finalized at about this stage by the lead Federal agency. Based on results of the consultation process, the project will develop a Treatment Plan, and will begin the Mitigation Phase. In the case of prehistoric sites that could not be avoided, this might involve a data recovery effort ("salvage excavations"). At the conclusion of the 2010 season, the team will prepare an Evaluation Report.

Year 4

In 2011 the project will complete the consultation process, and will complete any remaining evaluation phase and mitigation fieldwork as detailed in the stipulations of the PA. The project team will then prepare a final Evaluation, Treatment, and Summary Report based on Years 1-4 fieldwork, subsequent to the start of LNG Plant and pipeline construction activity.

Figure 5.11.1 Flow chart showing the Section 106 review process in relation to the FERC cultural resource filing requirements



5.12 Subsistence and Sociocultural Resources

The Project will likely have a substantial impact on the population, employment, and income of workers, their families, and support industries in the vicinity of the pipeline project. The total capital cost associated with the pipeline would be $22 billion, and would take 4 years to build. The largest impact to the state and local economy would be the tax revenues it would generate. The TAPS Renewal EIS estimated that revenues from the pipeline would amount to $189 million annually from royalties and severance taxes and $188 million annually in property taxes. These revenues would help to offset the loss of revenues to State and local economies associated with declining oil production of North Slope fields.

Subsistence activities are an important component of the local economy in each of the study area communities. The economies of village communities are characterized by few full-time jobs, limited opportunities to earn cash, and high participation rates in wild food harvests for personal consumption.

The Alaska National Interest Lands Conservation Act (ANILCA), passed by Congress in 1980, mandates that rural residents of Alaska be given a priority for subsistence uses of fish and wildlife. In 1989, the Alaska Supreme Court ruled that ANILCA's rural priority violated the Alaska Constitution. As a result the Federal government manages subsistence uses on Federal public lands and waters in Alaska – about 230 million acres or 60 percent of the land within the state.

State law is based on Title 16 of Alaska Statutes (AS 16) and Title 5 of the Alaska Administrative Code (05 AAC 99) and regulates State subsistence uses. Under State law, "'subsistence uses' means the noncommercial, customary and traditional uses of wild, renewable resources by a resident domiciled in a rural [sic] area for direct personal or family consumption as food, shelter, fuel, clothing, tools, or transportation, for the making and selling of handicraft articles out of non-edible by-products of the fish and wildlife resources taken for personal or family consumption, and for customary trade, barter, or sharing for personal or family consumption" (AS 16.05.940[32]).

Federal subsistence law is based on Title VIII of the 1980 ANILCA Act and regulations found in 36 CFR 242.1 and 50 CFR 100.1. Under federal law, "subsistence uses means the customary and traditional uses by rural Alaska residents of wild renewable resources for direct personal or family consumption as food, shelter, fuel, clothing, tools, or transportation; for the making and selling of handicraft articles out of non-edible byproducts of fish and wildlife resources taken for personal or family consumption; for barter, or sharing for personal or family consumption; and for customary trade" (ANILCA Title VIII Section 803).

The social implications of commercial development associated with the proposed pipeline project for communities in Alaska are not fully understood. There are the potential direct benefits of economic growth that many look forward to, such as more employment opportunities, more discretionary income, and expanded public services. The overall positive result may be more money in the local economy, easier transportation access and cheaper goods, lower construction costs, and improved access to basic amenities that make life easier for elders and other community members.

However, there are also possible negative social trends associated with rapid industrial development in small rural communities, including general anomie, excessive alcohol and drug use, abusive and self-destructive behavior, higher accident rates, loss of Native language and subsistence skills, dissolution of family relationships, decline in community rituals and festivities, and the dilution of cultural values such as sharing, reciprocity, respect for others, and consensual decision making. These social ills could arise from such potential direct effects of oil development as an influx of outsiders and a displacement of subsistence hunting and fishing activities. These direct effects are likely to be concentrated in those communities closest to the oil development should it occur.

5.12.1 Existing Information

The TAGS EIS provided information on subsistence activities and resource uses by Alaska Natives near the proposed pipeline route. Information on the regional and village economy, including income and employment, was provided in the EIS. Information on subsistence resource harvesting and economy in the vicinity of the proposed LNG terminal was provided in the LNG EIS. The TAPS Renewal EIS provided

information on the national, regional, local, and village economies affected by the pipeline; described historic and current subsistence uses and how the pipeline has impacted subsistence activities; and described Alaska native and non-native social systems. It also made projections regarding the potential impact of a natural gas pipeline on State and local economies, subsistence uses, and sociocultural systems as part of the cumulative effects analysis.

Information on the effects of oil and gas activities on socioeconomics, subsistence, and sociocultural systems has been prepared for numerous EISs done in the vicinity of the Project pipeline route, including for the Northeast and Northwest National Petroleum Reserve-Alaska EISs and the Yukon Flats National Wildlife Refuge Land Exchange EIS. These documents include much information on subsistence and sociocultural conditions on the North Slope and Yukon Flats, and in part are based on extensive discussions with village Natives.

These sources describe the economic conditions on the North Slope and for villages and communities along the proposed pipeline route. They include descriptions of resources used by Alaska Natives, harvest areas, and seasons in which resources are harvested. They provide information on environmental justice factors associated with the projects. They also discuss how oil and gas and other commercial development have impacted sociocultural systems of Alaska Natives.

5.12.2 Information Gaps

Estimates of employment, wages, income, and tax revenues associated with the Project were developed as part of the TAPS Renewal EIS and for EISs conducted in support of development in the National Petroleum Reserve-Alaska and in the Yukon Flats. Other benefits of the pipeline include the possibility of further North Slope economic development, development of new gas fields near the pipeline route, including in the Yukon Flats and Southern National Petroleum Reserve-Alaska, and potential for a reduction in the cost of natural gas throughout the State. The availability of a reliable supply of natural gas would also stimulate industrial development, and allow industries that have closed due to the lack of a source of natural gas, such as the Agrium fertilizer plant in Kenai, to reopen. The costs and benefits of economic development a associated with the Project would have to be evaluated as part of an EIS.

The effects of oil and gas development, including construction of a natural gas pipeline, on the subsistence uses and sociocultural systems of Alaska Natives living near the project have been assesses as part of the TAPS Renewal EIS and several EISs done for proposed oil and gas development on the North Slope and near the pipeline route. However, the effects of the Project on subsistence and sociocultural systems would have to be further refined as types and location of Project-associated facilities are better defined. This information will be needed to prepare the EIS and to identify measures to ensure that Alaska Natives participate in the economic benefits of the project, including use of Alaska Native companies on the pipeline construction project, and that their subsistence rights and resources are protected. In addition, the project has the potential to adversely impact Alaska Native and non-native sociocultural systems. Programs would have to be identified to ensure that Alaska Native and non-native sociocultural systems are not harmed by the Project.

5.12.3 Information and Studies Needed to Fill Data Gaps

The Owner expects to review estimates of employment, wages, income, and tax revenues associated with the Project were developed as part of the TAPS Renewal EIS and for EISs conducted in support of development in the National Petroleum Reserve-Alaska and in the Yukon Flats. It is also expected that economic modeling would be conducted to assess the socioeconomic costs and benefits of the Project.

The effects of oil and gas development, including construction of a natural gas pipeline, on the subsistence uses and sociocultural systems of Alaska Natives living near the project would be evaluated based on previous studies and discussions with affected villages and communities in proximity to the Project and studies of affected resources. Studies may be conducted to determine subsistence resources and use areas that could be affected by the Project. Fish and wildlife studies would evaluate the Project's effects on fish and game movements, and increased competition among Alaska Native and non-native resource users for fish and game due to an influx of workers and their families into subsistence use

areas. Measures would be identified to minimize effects to subsistence resources and users during Project construction and operation, to minize effects to sociocultural systems, and to develop procedures to maximize Alaska Native employment on the project.

5.13 Special Use Areas / Areas of Critical Environmental Concern / Coastal Zone Management

The Project will be located near important Federal and State special use areas and areas of critical environmental concern. In addition, facilities will also be located near coastal areas and subject to the requirements of the Federal Coastal Zone Management Act (CZMA), Alaska Coastal Management Act and Alaska Coastal Zone Management Program, North Slope Borough Coastal Management Plan (CMP), and Valdez CMP. Construction noise, dust, and visual impacts could affect these areas, or views from these areas. The project may also improve access to special use and other important areas.

5.13.1 Existing Information

Public reserves; Federal and State recreation areas, parks forests, and game refuges; camping areas; popular fishing lakes, rivers, and streams; and rafting rivers have been described near the pipeline ROW, near Valdez, and in Prince William Sound for the TAGS and TAPS projects. Public lands near the TAGS pipeline route had been considered for Wilderness Area designation, but were withdrawn due to proximity to TAPS facilities. Several existing Wilderness and other special areas, including the Arctic National Wildlife Refuge, the Gates of the Arctic National Park and Preserve, and the Wrangell-Saint Elias National Park and Preserve, are near the proposed ROW and could be indirectly impacted by the project. The proposed ROW should not impact the Gulkana and Delta Wild and Scenic River areas, nor national parks or refuges.

Recreation and subsistence use were the primary land uses at the proposed LNG facility. The facility was subject to policies identified in the Valdez District CMP and Alaska CMP. No special areas of concern are found near Anderson Bay.

The TAPS ROW consists of Federal (47%), State (43%) and private (10%) land. Conservation system units that have been designated in the vicinity of TAPS. They include national parks and wildlife refuges; Federally-designated Wilderness Areas; BLM-administered lands including national recreation areas; and State lands including recreation sites, areas, and parks. BLM-administered lands near the ROW include Areas of Critical Environmental Concern, which were established to identify and manage BLM lands requiring special management to protect resources. Portions of the TAPS are subject to coastal zone management policies. The North Slope Borough CMP requires that development activities not substantially interfere with subsistence activities or jeopardize subsistence resources. The Valdez CMP allows for a variety of development activities, but prioritizes approval of activities that are water related or water dependent.

Information on the Wilderness Area associated with the Gates of the Arctic National Park and Preserve; three national wildlife refuges within several miles of the TAPS (Arctic National Wildlife Refuge [NWR], Yukon Flats NWR, and Kanuti NWR); and BLM White Mountains National Recreation Area is available from studies conducted for TAPS. Visitation rates along the Dalton Highway and visitation rates at campgrounds along the highway are recorded by State and Federal agencies. The BLM used the Recreational Opportunity Spectrum to categorize recreation resources along the TAPS. State and Federal agencies have also developed management guidelines for the Delta and Gulkana Wild and Scenic Rivers for those portions on or near the TAPS.

No Federal designated or proposed Wilderness Areas exist within or adjacent to the TAPS ROW corridor. The only Federally-designated Wilderness Area within a few miles of the TAPS ROW is within the Gates of the Arctic National Park and Preserve.

The cumulative effects analysis of the TAPS ROW Renewal EIS noted that a gas pipeline will have some effects on land use in the vicinity of the TAPS. Aesthetics will be affected along and/or within the TAPS ROW, with resulting effects on recreation. Noise from construction, operation, and maintenance of the

gas pipeline will interfere with recreational activities. An influx of people associated with construction will also impact recreational opportunities and place greater demands on services along the Dalton Highway. Any compressor, pigging, or valve stations constructed along the gas pipeline and visible from the Gates of the Arctic Wilderness Area will add to the existing visual impact. Noise from construction will be audible in the wilderness, as will noise from vehicles and support aircraft. An increase in construction personnel could result in increased use of the Wilderness Area.

The gas pipeline could have cumulative effects on the coastal zone. The proposed gas conditioning plant could add to the existing visual impact within the North Slope Borough, although a plant will be allowed under the North Slope Borough CMP if it does not adversely impact subsistence activities. The LNG facility and tanker traffic could have visual impacts in Valdez.

5.13.2 Information Gaps

Information is lacking on the proximity of the Project ROW to conservation system units and other special areas. Areas of particular interest include Areas of Critical Environmental Concern, Gates of the Arctic Wilderness, Delta and Gulkana Wild and Scenic Rivers, national wildlife refuges, and State recreation areas. In addition, information is needed on project engineering to better understand how the pipeline and other facilities will be constructed near sensitive areas, including crossings of Wild and Scenic Rivers, and if Project development complies with the State of Alaska, and North Slope Borough and Valdez District CMPs. Information is required on increases in recreational use from activities associated with the Project. Information on sensitive resources will be used in project facility siting; to prepare a Coastal Project Questionnaire (ADNR) to determine the project's consistency with the standards of the Alaska CMP and district coastal management plans; to obtain Special Area Permits (ADF&G); to obtain permission to use dedicated park lands (ADNR); to comply with local land use ordinances; and to assess impacts and to develop BMPs and mitigation needed for FERC licensing and the NEPA EIS.

5.13.3 Information and Studies Needed to Fill Data Gaps

Information on the location of special use and other sensitive areas will be reviewed and the proximity of these areas to project facilities, based on preliminary designs, will be determined. Based on this review, information is needed from Federal and State agencies on study requirements and mitigation to minimize project effects to sensitive resource values and opportunities to relocate project facilities away from special use areas. The North Slope Borough, Valdez District, and Alaska CMPs will be reviewed to determine if project would comply with local coastal management plan guidance. The Alaska CMP review period is a minimum of 50 days. If conflicts are identified, discussions will be held with State and local agencies to determine how project features may be modified to bring the project into compliance with coastal management guidelines. It is anticipated that much of this work will be completed in Year 1, with minor modifications to pipeline route and facility locations, and discussions with agencies to resolve special use area and coastal management issues, occurring during Year 2.

5.14 Visual

Visual resources are defined as the land, water, vegetation, animals, and structures that are visible on land. The Project ROW will pass through areas that contain outstanding visual resources. With the exception of the TAPS and parallel roads, most of the area is pristine and natural, especially north of the Yukon River. Along the entire corridor, most background views are untouched by human activity. Sightseeing is an important recreational activity in Alaska, and is the primary activity along the Dalton Highway.

5.14.1 Existing Information

The TAGS and TAPS ROWs are associated with areas that are aesthetically important. These include vistas of the North Slope tundra, the Brooks Range, the Alaska Range, and Prince William Sound. A 1973 ASPC comprehensive report was prepared on the aesthetics of the TAPS project. The report provided major aesthetic criteria that were used to identify aesthetically sensitive areas and how the criteria could be used to prevent and mitigate disturbance of sensitive viewsheds along the route. The project would open up areas to greater enjoyment by the public, but construction would also cause visual scars from buried pipeline construction and aerial stream crossings. Nearly all of the proposed pipeline ROW south of the Brooks Range would have required clearing of brush and forest cover, altering the natural environment. The pipeline ROW could be visible from higher elevations, and communication towers, building, and other facilities would degrade the visual landscape. Some construction impacts, such as the pipeline ROW, borrow sites, cut-and-fills, and access roads would remain landscape features indefinitely.

Anderson Bay as a shallow, well-defined bay, with a steep rocky shoreline composed of cliffs that rise 30 to 40 feet above the shoreline. The Chugach Mountains form a backdrop to the site, and dense forests are found near the project area. Construction of the facility would result in the conversion of about 430 acres of forest, shrubland, and wetland habitat to industrial uses. To reduce visual impacts, Yukon Pacific proposed creating an approximately 2,630 acre buffer zone around the facility. Still, development would have occurred down to the water's edge. The pristine, rocky coastline of the facility site would have been replaced with a large, industrial facility. To reduce visual impacts, Yukon Pacific proposed to use shoreline protection measures that provided for a more natural appearance by preserving existing landforms and vegetation, and using landscape and architectural treatments that reduced the contrast of the aboveground structures within the natural landscape.

Most of the area north of the Yukon River is pristine and natural, while south of the river, man's impacts are localized. Important visual resources, viewpoints, and overlooks are given by milepost. All portions of the TAPS ROW are managed in accordance with Class IV visual resource management objectives, except for small portions of Wild and Scenic River corridors (Class I). Consequently, major modifications to the existing landscape are allowed for activities related to energy transportation, except in Class I areas, where the management objective is to preserve the existing character of the landscape. Special attention is given to protect visual resources on BLM-designated Areas of Critical Environmental Concern. Potential visual impacts of the TAPS were considered during the design, and stipulations were included in both the State and Federal ROW agreements.

The cumulative effects analysis of the TAPS ROW Renewal EIS noted that a gas pipeline would have some effects on land use in the vicinity of the TAPS. Aesthetics would be affected along and/or within the TAPS ROW, with resulting effects on recreation. Any compressor, pigging, or valve stations constructed along the gas pipeline and visible from the Gates of the Arctic Wilderness Area would add to the existing visual impact. These facilities, along with the gas conditioning plant and LNG facility would add to the existing visual impacts along the TAPS ROW. There could be increased recreational use along the pipeline ROW and in Prince William Sound from the public and construction workers and their families. The gas pipeline could have cumulative effects on the coastal zone. A gas conditioning plant could add to the existing visual impact within the North Slope Borough, although a plant would be allowed under the North Slope Borough CMP if it does not adversely impact subsistence activities. The LNG facility and tanker traffic could have visual impacts in Valdez.

5.14.2 Information Gaps

Information is lacking on the proximity of the Project ROW to conservation system units and other special areas. Areas of particular visual interest include Areas of Critical Environmental Concern, Gates of the Arctic Wilderness, Delta and Gulkana Wild and Scenic Rivers, national wildlife refuges, State recreation areas, and scenic vistas and viewpoints. In addition, information is needed on project engineering to better understand how the pipeline and other facilities will be constructed near visually sensitive areas. Information on visual resources will be used in project facility siting; to comply with visual management objectives on Federal lands; and to assess impacts and develop BMPs and mitigation needed for FERC licensing and the NEPA EIS.

5.14.3 Information and Studies Needed to Fill Data Gaps

Information on the location of aesthetically important areas will be reviewed and the proximity of these areas to project facilities, based on preliminary designs, will be determined. Based on this review, information is needed from Federal and State agencies on study requirements and mitigation to minimize *project effects to aesthetically important areas and opportunities to relocate project facilities away from* these areas. It is anticipated that much of this work will be completed in Year 1, with minor modifications to pipeline route and facility locations, and discussions with agencies to resolve issues related to visual resources, occurring during Year 2. A Visual Resource Management Plan will be prepared in support of the State ROW lease application.

5.15 Recreation

Much of the area associated with the Project is relatively pristine and provides numerous high-quality recreational opportunities.

5.15.1 Existing Information

Recreational activities along the TAPS include hiking, hunting, sport fishing, camping, boating, floating, wilderness, and winter activities. Since the route parallels year-round highways, access to the area is good. Public reserves, Federal and State recreation areas, camping areas, popular fishing lakes, rivers and streams, and rafting rivers have been described near the TAPS and TAGS ROWs. Recreational use along the pipeline route would likely increase as new access roads are constructed and identified areas where access roads would improve access to roadless areas. Impacts to vegetation, fish and wildlife, and visual resources could result from an increase in recreation use associated with the general public and construction workers and their families. Recreational users might be disturbed by construction noise and dust, and by visual obstructions associated with pipeline facilities. Construction activities would disturb wildlife, potentially reducing hunting and wildlife viewing success along the pipeline route during construction. All-terrain-vehicle, snowmobile, and other off-road vehicle use could impact soil and *vegetation, resulting in some sedimentation in streams, and disturbance to wildlife.*

The LNG Facility will be located in the northeast corner of Prince William Sound, an important recreation area. Recreational activities tend to focus on natural features. Fishing is an important recreational activity. *The adjacent Chugach National Forest is used for timber production and recreational purposes. There are* also several parks in the area. The facility site is little used by recreationalists, but noise, dust, and activity from construction would discourage marine and land-based recreation in and near Anderson Bay. Construction workers and their families would increase demand on recreational facilities in the area.

Visitor use statistics for the Dalton Highway and associated campgrounds and other recreational facilities are compiled by State and Federal agencies. Construction of the TAPS and Dalton Highway have increased visitation of previously remote areas along the TAPS. Recreational use north of the Yukon River still remains fairly limited due to the remoteness of the area. The Chugach National Forest is an important recreation area near Valdez. Recreational use of the Delta and Gulkana Wild and Scenic Rivers has increased steadily the past few decades. Prior to 2001, recreational use along the TAPS included visits to TAPS facilities; these have been curtailed since the events of September 11, 2001.

A gas pipeline would have some effects on recreation along the TAPS ROW. Aesthetics would be affected along and/or within the TAPS ROW, with resulting effects on recreation. Noise from construction, operation, and maintenance of the gas pipeline would interfere with recreational activities. An influx of people associated with construction would also impact recreational opportunities.

5.15.2 Information Gaps

Information is lacking on the proximity of the Project ROW to conservation system units and other recreational areas. Areas of particular visual interest include Areas of Critical Environmental Concern, Gates of the Arctic Wilderness, Delta and Gulkana Wild and Scenic Rivers, national wildlife refuges, State recreation areas, and scenic vistas and viewpoints. In addition, information is needed on project engineering to better understand how the pipeline and other facilities will be constructed near recreational

areas. Information is also required on increases in recreational use from activities associated with the project. Information on recreation will be used in project facility siting and to assess impacts and develop BMPs and mitigation needed for FERC licensing and the NEPA EIS.

5.15.3 Information and Studies Needed to Fill Data Gaps

Information on the location of important recreation areas will be reviewed and the proximity of these areas to project facilities, based on preliminary designs, will be determined. Based on this review, information will be obtained from Federal and State agencies on study requirements and mitigation to minimize project impacts to important recreation areas and opportunities to relocate project facilities away from these areas. It is anticipated that much of this work will be completed in Year 1, with minor modifications to pipeline route and facility locations, and discussions with agencies to resolve issues related to recreational resources, occurring during Year 2.

6.0 References

Cupina, Robert J. 2007. FERC and the development of an Alaska natural gas pipeline. Second Annual Alaska Oil & Gas Symposium, Challenges and Opportunities for Exploration and Development. September 18, 2006. Anchorage, Alaska. Publication P905W07-ANC

FERC. 2006. 117 FERC ¶ 61, 076, United States Of America, Federal Energy Regulatory Commission, 18 CFR Parts 153, 157, 375, and 385, (Docket No. RM06-1-000; Order No. 687). Regulations Implementing the Energy Policy Act of 2005; Coordinating the Processing of Federal Authorizations for Applications under Sections 3 and 7 of the Natural Gas Act and Maintaining a Complete Consolidated Record

U.S. Department of the Interior, Bureau of Land Management. 2005. Northeast National Petroleum Reserve-Alaska Final Amended Integrated Activity Plan/Environmental Impact Statement. BLM/AK/PL-05/006+1610+930. Anchorage, AK.

U.S. Department of the Interior, Bureau of Land Management and Minerals Management Service. 2004. Northwest National Petroleum Reserve-Alaska Final Amended Integrated Activity Plan/Environmental Impact Statement. Anchorage, AK.

Federal Energy Regulatory Commission. 1995. Yukon Pacific LNG Project Final Environmental Impact Statement. FERC/EIS-0071. Office of Pipeline Regulation. Washington, DC.

U.S. Department of the Interior, Bureau of Land Management and U.S. Army Corps of Engineers Alaska District. 1988. Trans-Alaska Gas System Final Environmental Impact Statement. BLM-AK-PT-88-003-1792-910. Anchorage, AK.

U.S. Department of the Interior, Bureau of Land Management. 2002. Final Environmental Impact Statement Renewal of the Federal Grant for the Trans-Alaska Pipeline System Right-of-Way. Anchorage, AK.

Addendum 1
Summary of Environmental Data Gaps

Summary of Environmental Data Gaps

Resource	Regulatory Drivers (Agency)/Data Needs	Representative Data Sources	Data Gaps/Surveys
Land Use	• ROW Lease (JPO) • Reclamation Plan (JPO) • Blasting Plan (JPO) • Camps Plan(JPO) • Surveillance and Monitoring Plan (JPO) • EA/EIS/FERC data requirements	• TAGS EIS and LNG Project EIS and permit applications • TAPS Renewal EIS • Baseline studies/agency data on North Slope, along TAPS ROW, and for Yukon Flats NWR Land Transfer EIS • ANGTA Glenallen to Palmer ROW analysis for Denali/TAPS alternative	• Need to identify land ownership associated with Project facilities.
Air Quality	• PSD Permit and Title V Permit (ADEC) • Analysis of Effects to Class I Areas (ADEC) • Best Available Control Technology (ADEC) • Air Quality Plan (JPO) • EA/EIS/FERC data requirements	• TAGS EIS and LNG Project EIS and permit applications • TAPS Renewal EIS • Baseline studies/agency data on North Slope, along TAPS ROW, and for Yukon Flats NWR Land Transfer EIS, and in Fairbanks and Valdez.	• Baseline air quality data (existing data may be out-of-date). • Air quality analysis and emissions done for earlier TAGS may be out-of-date and emissions not calculated for gas conditioning plant. • Modeling to determine impacts to Class I areas, to determine BACT, and to determine greenhouse gas emissions.
Soils and Permafrost	• Construction General Permit, Storm Water Pollution Prevention Plan, and Erosion Control Monitoring Plan (USEPA) • Clearing, Erosion and Sediment Control Plan (JPO) • Grading and Drainage Plan (JPO) • Overburden and Excess Material Disposal (JPO) • Dust Control Plan (JPO) • Restoration Plan (JPO) • EA/EIS/FERC data requirements	• TAGS EIS and LNG Project EIS and permit applications • TAPS Renewal EIS • Baseline studies/agency data on North Slope, along TAPS ROW, and for Yukon Flats NWR Land Transfer EIS • ANGTA Glenallen to Palmer ROW analysis for Denali/TAPS alternative	• Route reconnaissance to identify areas with potential for soil erosion, sedimentation of streams, mass wasting, permafrost degradation, frost heave impacts, especially in areas that deviate significantly from the existing TAPS ROW. • Thermal modeling to assess the effects of disturbance caused by clearing, placement of workpads, and ditching.
Sand, Gravel, and Quarry Resources	• Material Sales (JPO) • Overburden and Excess Material Disposal Plan (JPO) • Material Exploration and Excavation Plan (JPO) • EA/EIS/FERC data requirements	• TAGS EIS and LNG Project EIS and permit applications • TAPS Renewal EIS • Baseline studies/agency data on North Slope, along TAPS ROW, and for Yukon Flats NWR Land Transfer EIS • ANGTA Glenallen to Palmer ROW analysis for Denali/TAPS alternative	• Identify existing mineral resources near the TAPS that will be available for use. • Identify additional mineral material sources and access roads. • Determine the effects of mining on soil, water, vegetation, fish and wildlife, cultural, and other resources. • Develop detailed mining plans.

Resource	Regulatory Drivers (Agency)/Data Needs	Representative Data Sources	Data Gaps/Surveys
Seismicity	• *EA/EIS/FERC data requirements* • Minimum siting and design requirements of regulations in 49CFR193.2061: Seismic Investigation and Design Forces (USDOT)	• TAGS EIS and LNG Project EIS and permit applications • TAPS Renewal EIS • Baseline studies/agency data on North Slope, along TAPS ROW, and for Yukon Flats NWR Land Transfer EIS • ANGTA Glenallen to Palmer ROW analysis for Denali/TAPS	• Conduct a comprehensive study of the historical seismicity and evaluation of the gas pipeline project. • Site-specific information needed to identify potential areas where permanent ground deformation related to liquefaction, slope movements, or surface-fault offsets that might be triggered by earthquakes. • Confirm location of active faults along the proposed pipeline route. • Identify areas where special pipeline engineering is required. • Identify potentially liquefiable areas or, areas where alignment changes are not feasible.
Paleontology	• Antiquities Act of 1906. • Federal Land Policy and Management Act of 1976. Archaeological Resources Protection Act of 1979 and Federal Cave Resources Protection Act of 1988 • Alaska Historic Preservation Act. • EA/EIS/FERC data requirements	• TAGS EIS and LNG Project EIS and permit applications • TAPS Renewal EIS • Baseline studies/agency data on North Slope, along TAPS ROW, and for Yukon Flats NWR Land Transfer EIS • ANGTA Glenallen to Palmer ROW analysis for Denali/TAPS	• A number of paleontological sites have been found along the TAPS ROW, but information on fossil sites will be limited for areas away from the TAPS ROW that might be impacted by the proposed natural gas pipeline. • Surveys will need to be conducted of newly-disturbed sites.

Resource	Regulatory Drivers (Agency)/Data Needs	Representative Data Sources	Data Gaps/Surveys
Water Resources and Quality	• NPDES Permit (USEPA) • General Construction Storm Water Permit (USEPA) • Nationwide Permits (USACE) • Temporary Water Use Permit, Water Appropriations (ADNR) • Wastewater from Excavations (ADEC) • 401 Water Quality Certification (ADEC) • Hydrostatic Testing Dewatering (ADEC) • Disposal of Contained Water (ADEC) • Storm Water Pollution, Prevention, and Control Plan (JPO) • Erosion and Sedimentation Control Plan (JPO) • Pesticides, Herbicides, and Chemicals Plan (JPO) • River Training Structures (JPO) • Stream, River, and Floodplain Crossings (JPO) • Water and Quality Monitoring plans (JPO) • EA/EIS/FERC data requirements	• TAGS EIS and LNG Project EIS and permit applications • TAPS Renewal EIS • Baseline studies/agency data on North Slope, along TAPS ROW, and for Yukon Flats NWR Land Transfer EIS • ANGTA Glenallen to Palmer ROW analysis for Denali/TAPS	• An evaluation of the stream morphology should be done for each crossing. Crossings can then be evaluated based on their basic characteristics. An example of this is to define meander belt widths to understand the potential future locations of a stream. Doing this analysis will reduce the chance that future river migration will threaten the pipeline. • We recommend a thorough site visit to many of the TAPS corridor river crossings and interviewing maintenance personnel to understand how crossings have worked or not worked over time. • To gain knowledge and agency buy-in of proposed installation and construction methods, we propose undertaking a demonstration stream crossing project on the North Slope before pipeline construction begins.

Resource	Regulatory Drivers (Agency)/Data Needs	Representative Data Sources	Data Gaps/Surveys
Wetlands and Riparian Areas	• Executive Order 11990 • Wetlands Fill (404) Approval (USACE) • Wetland and Waterbody Construction and Mitigation Procedures (FERC) • Upland Erosion Control, Revegetation, and Maintenance Plan (FERC) • Resource Report #2 Requirements (FERC) • Water Quality Plan (JPO) • Stream, River, and Floodplains Crossing Land (JPO) • Wetlands Construction Plan (JPO) • Executive Order 11990 Protection of Wetlands • EA/EIS/FERC data requirements	• Aerial photography of the corridor owned by various entities • National Wetland Inventory maps prepared by the U.S. Fish and Wildlife Service • YPC-owned on-site wetland delineation data and mapping within TAGS corridor, covering much of the North Slope-to-Valdez route • YPC-owned topographic mapping within the TAGS corridor • Producers-owned wetland delineation data acquired within a proposed corridor in 2001 • On-site wetland delineation data collected by other resource development and public and private infrastructure developers since 1998. Some of these data may have been provided to the Corps of Engineers or other public agencies and will be available through the Freedom of Information Act (FOIA). Some of these data may be obtained directly from the public or private agencies that generated the data.	Data gap: Complete and accurate wetland delineation • Obtain high-quality orthorectified aerial photography. • Compile publicly-available topographic, wetland, soil, vegetation, and hydrologic data. • Evaluate quality and relevance of available and purchasable data. • Negotiate purchase of on-site wetland determination data and mapping from private entities. • Edit and supplement existing mapping in GIS based on aerial photography and site data from above sources. • Identify and fill gaps in on-site delineation data with fieldwork to produce accurate wetland boundaries. Data gap: Site information on wetlands needed to plan crossing and restoration. • Glean pertinent information from the listed sources. • Acquire vegetation, soil, and hydrology information at representative sites sufficient to develop a project-specific wetland restoration plan and site-specific plans for certain crossings

Resource	Regulatory Drivers (Agency)/Data Needs	Representative Data Sources	Data Gaps/Surveys
Vegetation	• Timber Removal Permit (ADNR) • Fire Control Plan (ADNR)Burn Permit (ADEC) • Clearing and Dust Control (JPO) • Pesticides, Herbicides, and Chemicals Plan (JPO) • Restoration Plan (JPO) • EA/EIS/FERC data requirements	• TAGS EIS and LNG Project EIS and permit applications • TAPS Renewal EIS • Baseline studies/agency data on North Slope, along TAPS ROW, and for Yukon Flats NWR Land Transfer EIS • ANGTA Glenallen to Palmer ROW analysis for Denali/TAPS • Aerial photography of the corridor owned by various entities • National Wetland Inventory maps prepared by the U.S. Fish and Wildlife Service • YPC-owned on-site wetland delineation data and mapping within TAGS corridor, covering much of the North Slope-to-Valdez route • YPC-owned topographic mapping within the TAGS corridor	• Obtain high-quality orthorectified aerial photography. • Compile publicly-available topographic and vegetation data. • Edit and supplement existing mapping in GIS based on aerial photography and site data from above sources. • Identify and fill gaps in on-site delineation data with fieldwork to produce accurate wetland boundaries. • Characterize vegetation on area that will be cleared, graded, or otherwise altered for site preparation. • Identify and mitigate sources of dust that could kill plants. Identify suitable revegetation measures.
Fish and Other Aquatic Organisms - General	• Section 404 Permit (USACE) • Temporary Water Use Permit (ADNR) • Title 41 Fish Habitat Permit (ADNR) • Material Sales (JPO) • Stream, River, and Floodplain Crossings Plan (JPO) • EA/EIS/FERC data requirements	• TAPS ROW Renewal EIS (lists fish habitat and usage along TAPS ROW) • TAGS EIS (lists fish habitat and usage along TAPS ROW and key fish harvest areas) • ADF&G interactive maps and databases; BLM and APSC fish databases providing information on fish species and habitats associated with proposed ROW and sensitivity ratings (see Table 3.19-1 TAPS ROW Renewal EIS) • Fish studies associated with North Slope oil and gas development	• Data Gaps - unavailable or incomplete information on fish use for portions of waterbodies outside TAPS ROW. • Field Studies - review existing databases for waterbodies impacted by project that may have EFH; conduct site assessments for newly-disturbed waterbodies to assess impact to fish and their habitats, including spawning/wintering habitats and areas that could be impacted by ice blockage associated with underground pipeline. • Determine appropriate stream crossing method (boring or trenching) and season for each stream impacted by project.

Resource	Regulatory Drivers (Agency)/Data Needs	Representative Data Sources	Data Gaps/Surveys
Fish and Other Aquatic Organisms - Species of Concern	• ESA (NMFS) • Essential Fish Habitat (EFH) Assessment (Magnusson-Stevens Fishery Conservation and Management Act) – anadromous salmon EFH associated with pipeline ROW (NMFS) • Section 404 Permit (USACE) • Temporary Water Use Permit (ADNR) • Material Sales (JPO) • Fish Habitat Permit (ADNR) • EA/EIS/FERC data requirements	• TAPS ROW Renewal EIS (lists salmon streams along TAPS ROW) • TAGS EIS (lists fish habitat and usage along TAPS ROW and key fish harvest areas) • ADF&G EFH interactive maps showing EFH in vicinity of TAPS (e.g., Catalog of Waters Important for Spawning, Rearing or Migration of Anadromous Fishes) • Fish studies associated with North Slope oil and gas development • Same as for fish (general)	• Need to identify EFH along proposed ROW. • Review existing databases for waterbodies impacted by project that may have EFH. • Other studies as identified for Fish and Other Aquatic Organisms – General.
Wildlife – General	• Migratory Bird Conservation Act of 1929 • Bald and Golden Eagle Protection Act, • Executive Order 13186 Responsibilities of Federal Agencies to Protect Migratory Birds • State Game Refuge Permit (ADF&G) • Migratory Bird Protection Plan (JPO) • Wildlife –Human Interaction Plan (JPO) • EA/EIS/FERC data requirements	• TAGS EIS and LNG Project EIS and permit applications • TAPS Renewal EIS • Baseline studies/agency data on North Slope, along TAPS ROW, and for Yukon Flats NWR Land Transfer EIS • ANGTA Glenallen to Palmer ROW analysis for Denali/TAPS	• Existing databases should be reviewed and consultations held with agencies and organizations responsible for wildlife management in Alaska to identify important wildlife species and their habitats that could be impacted by the project. • Surveys for occurrence and habitat use of sensitive and other important wildlife species (waterfowl, caribou, brown and black bear, moose, mountain goat, Dall sheep), their habitats, and areas of high concentrations along the proposed pipeline facilities. Surveys should be conducted prior to construction, and in areas and during times of the year when species are most likely to be found in the vicinity of the proposed project.

Resource	Regulatory Drivers (Agency)/Data Needs	Representative Data Sources	Data Gaps/Surveys
Wildlife - Species of Concern	• ESA (USFWS) – Eskimo curlew (endangered), Steller's eider, spectacled eider (threatened); American peregrine falcon, Arctic peregrine falcon, olive-sided flycatcher, gray-cheeked thrush, Townsend's warbler, blackpoll warbler (state sensitive); raptors; Steller sea lion and several whale species (NMFS) • Bald Eagle Nest Survey (USFWS) • EA/EIS/FERC data requirements	• TAPS ROW Renewal provides general information on species habitats and locations • TAGS EIS (lists important raptor, and waterfowl nesting/concentration areas and periods of use) • Baseline studies/agency data on North Slope, along TAPS ROW, and for Yukon Flats NWR Land Transfer EIS	• Need to update sensitive species occurrences along ROW. • Conduct spring/summer surveys for eiders use MP 1 to MP 12; survey proposed construction areas for falcon and other raptor nests; conduct general survey of newly-disturbed areas for other species of concern. • Requests should be made to the USFWS and NMFS for lists of threatened and endangered species, and species proposed for listing, that could be found near the proposed project. After receipt of these requests, the applicant should initiate informal consultation with the Services.

Resource	Regulatory Drivers (Agency)/Data Needs	Representative Data Sources	Data Gaps/Surveys
Cultural Resources	• National Historic Preservation Act of 1966, as amended (16 U.S.C. § 470). (This is the key Federal law dealing with cultural resources. Of particular importance is Section 106). • Archaeological and Historic Preservation Act of 1974 (16 U.S.C. § 469). • Archaeological Resources Protection Act of 1979 (16 U.S.C. § 470aa-470ll). • Native American Graves Protection and Repatriation Act of 1990 (25 U.S.C. § 3001 et seq.). • American Indian Religious Freedom Act of 1978 (42 U.S.C. § 1996). • Historic Sites Act of 1935 (16 U.S.C. § 1982). • 36 CFR 800: Protection of Historic Properties. (This is the key regulation implementing the NHPA of 1966) • 18 CFR 380.12(f): FERC cultural resources process • 36 CFR 60: National Register of Historic Places • 43 CFR 7: *Protection of Archaeological* Resources • 43 CFR 10: Native American Graves and Repatriation Act • E.O. 11593 Protection and Enhancement of the Cultural Environment (1971) • E.O. 13007. Indian Sacred Sites (1996) • Alaska Historic Preservation Act (Title 41, Chapter 35). (This is the key State legislation providing the legal framework for the State historic preservation program, along with the NHPA. It has no implementing regulations). • North Slope Borough Coastal Management Program Policies (As approved by the Coastal Policy Council 4/17/85; amended 3/31/88).	• Alaska Heritage Resource Survey (AHRS) database (ADNR) • National Register of Historic Places • BIA Native Allotments and 14(H)1 historic and cemetery sites data files • TAPS cultural resources surveys (1969-1975); many reports (Cook (ed.) 1970, 1971, 1973, 1976, 1977) • ANGTS cultural resources surveys (1978-1981); many reports (Shinkwin and Aigner 1979; Aigner 1979; Aigner and Gannon 1980; Aigner and Gannon 1981a; Aigner and Gannon 1981b; • TAGS EIS (1988) • YPC EIS (1995); main focus on Anderson Bay LNG facility (Hall 1990) • TAPS ROW Renewal EIS; many supporting documents by NLUR and others • AGPPT survey (2001). Three main proprietary reports prepared by NLUR/Chumis include a comprehensive data review and assessment of proposed gasline route from Prudhoe Bay to Canadian border. Phase I field survey of ~625 miles of one specific alignment (Potter et al. 2001a; Potter et al. 2001b; Potter et al. 2002). • Numerous archaeological, ethnographic and historical references	*Data Gaps:* • AHRS database not comprehensive, incomplete, in many cases not accurate/precise, and not adequate for Section 106 review • Previous surveys do not necessarily provide coverage of a new APE. Even a lateral offset of 100 ft. could mean new survey is required. Many data inconsistencies exist among the various surveys (e.g., inaccurate (pre GPS) site location data). In many cases, earlier methodologies are not adequate for current 36 CFR 800 review. • Assuming LNG facility location is same as YPC, the Anderson Bay Section 106 survey (Hall 1990) is probably adequate and may not need additional fieldwork *Surveys/data needs:* *Year 1* - Initiate Section 106 and FERC process - Establish undertaking and identify likely APE - Develop field plan, research design, and predictive model - Apply for Federal and State antiquity fieldwork permits - Identify consulting parties and initiate consultation - *Year 2* - Continue consultation process - Begin Identification Phase surveys - FERC filing Identification Phase surveys - Initiate Evaluation Phase fieldwork - Develop "Plan for Unanticipated Historic -Resources and Human Remains" (FERC requirement) - Prepare EIS sections - Prepare draft PA - Prepare Overview/ Survey and Evaluation Reports based on first year's fieldwork *Year 3* - Continue consultation process - Continue identification of new alignment revisions, material sources and other previously- unidentified areas

Resource	Regulatory Drivers (Agency)/Data Needs	Representative Data Sources	Data Gaps/Surveys
	• *Ordinance Establishing the Fairbanks* North Star Borough Commission on Historic Preservation. (86-097/2 (part), 1986; 87-053/4, 1987).		- *Continue Evaluation Phase fieldwork* - Finalize PA - Develop Treatment Plan and Begin Mitigation Phase - Prepare Evaluation Report based on second year's fieldwork *Year 4* - Complete consultation process - Complete Identification Phase of new alignment revisions, material sources and other previously-unidentified areas - Complete Evaluation Phase - Complete Mitigation Phase - Prepare final Evaluation, Treatment, and Summary Report based on Years 1-5 fieldwork
Subsistence and Sociocultural	• Alaska National Interest Lands Conservation Act (ANILCA) (16 U.S.C. § 3120). ANILCA Section 810 requires lead federal agency to: (1) notify appropriate state agency, local committees and regional councils (established under 16 U.S.C. § 3120), (2) give notice and hold hearings in the vicinity of the area involved, (3) determine that such restriction to subsistence is necessary and consistent, will involve the minimal *amount of public lands necessary to* accomplish its purposes, and reasonable steps will be taken to minimize adverse impacts. • Executive Order 12898 Environmental Justice	• TAGS EIS (1988) • YPC EIS (1995) • TAPS ROW Renewal EIS and supporting documents • Numerous ethnographic and historical references	*Data Gaps* • TAGS EIS not adequate by current standards • Existing data inadequate to characterize affected environment, although TAPS EIS is a good starting point • Key areas of concern are: availability of resources, access to resources, and competition for subsistence resources *Surveys/data needs* • Consultation with all affected native villages will most likely be required, including oral history interviews to characterize and map subsistence use areas. Some consultation efforts may coincide with consultation required under NHPA and 36 CR 800 and other government to government consultation • Public hearings as required by Section 810 of ANILCA.

Resource	Regulatory Drivers (Agency)/Data Needs	Representative Data Sources	Data Gaps/Surveys
Special Use Area/Areas of Critical Environmental Concern	• Wilderness Act • Wild and Scenic River Act • Alaska Coastal Management Program Review (ADNR) • Special Areas Permit (ADF&G) • State Parks Permit (ADF&G) • EA/EIS/FERC data requirements	• TAGS EIS and LNG Project EIS and permit applications • TAPS Renewal EIS • Baseline studies/agency data on North Slope, along TAPS ROW, and for Yukon Flats NWR Land Transfer EIS • ANGTA Glenallen to Palmer ROW analysis for Denali/TAPS	• Identify conservation system units and other special areas near Project. Areas of particular interest include Areas of Critical Environmental Concern, Gates of the Arctic Wilderness, Delta and Gulkana Wild and Scenic Rivers, national wildlife refuges, and state recreation areas. • Obtain project engineering to better understand how the pipeline and other facilities will be constructed near sensitive areas, including crossings of Wild and Scenic Rivers, and if proposed gas project development complies with the State of Alaska, and North Slope Borough and Valdez District CMPs. • Information is required on increases in recreational use from activities associated with the project. Information on sensitive resources would be used in project facility siting; to prepare a Coastal Project Questionnaire (ADNR) to determine the project's consistency with the standards of the Alaska CMP and district coastal management plans; to obtain Special Area Permits (ADF&G); to obtain permission to use dedicated park lands (ADNR); to comply with local land use ordinances.
Visual Resources	• Visual Resource Management Plan (JPO) • EA/EIS/FERC data requirements	• TAGS EIS and LNG Project EIS and permit applications • TAPS Renewal EIS • Baseline studies/agency data on North Slope, along TAPS ROW, and for Yukon Flats NWR Land Transfer EIS • ANGTA Glenallen to Palmer ROW analysis for Denali/TAPS	• Need information on the proximity of the proposed natural gas pipeline ROW to conservation system units and other special areas. • Information is needed on project engineering to better understand how the pipeline and other facilities will be constructed near visually sensitive areas. • Information is needed from federal and state agencies on study requirements and mitigation to minimize project effects to aesthetically important areas and opportunities to relocate project facilities away from these areas.
Recreation	• EA/EIS/FERC data requirements	• TAGS EIS and LNG Project EIS and permit applications • TAPS Renewal EIS • Baseline studies/agency data on North Slope, along TAPS ROW, and for Yukon Flats NWR Land Transfer EIS • ANGTA Glenallen to Palmer ROW analysis for Denali/TAPS	• Need information on the proximity of the Project ROW to conservation system units and other recreational areas. • Information is needed on project engineering to better understand how the pipeline and other facilities will be constructed near recreational areas. • Information is also required on increases in recreational use from activities associated with the project.

APPENDIX RR

Letter of Interest

[Confidential]

THIS PAGE CONTAINS PROPRIETARY OR TRADE SECRET INFORMATION THAT IS CONFIDENTIAL TO THE PORT AUTHORITY, WHO REQUESTS THAT THE INFORMATION BE KEPT CONFIDENTIAL AND EXEMPT FROM PUBLIC DISCLOSURE TO THE EXTENT PROVIDED IN AS 43.90.150 & AS 43.90.160

Revised Page Provided

Appendix RR – Expression of Interest in *participating in* the AGPA Project

AGPA requests confidential treatment of information contained in Appendix RR – Expression of Interest in participating in the AGPA.

The letter expressing interest in the AGPA project marked as Appendix RR to AGPA's AGIA application consists of and contains proprietary information (as defined by AS 43.90.900 (20) and Trade Secrets (as defined by AS 45.50.940 (3)). The letter from a corporate entity contains proprietary information and valued intellectual property and release of this information would cause significant damage to AGPA and its project. Appendix RR has been received by a company outside of AGPA under the understanding that the letter would remain confidential. There is no question that release of the information ". . . would adversely affect the competitive position of the applicant or materially diminish the commercial value of the information to the *applicant*[.]" AS 43.90.900 (2). Moreover, the information ". . . derives independent economic value, actual or potential, from not being generally known to, and not being readily ascertainable by proper means by, other persons who can obtain economic value from its disclosure or use;" and ". . . is the subject of efforts that are reasonable under the circumstances to maintain its secrecy." AS 45.50.940 (3).

Brief non-confidential summary pursuant to AS 43.90.160:

The information contained in Appendix RR – Expression of Interest on behalf of a corporate entity to participate in the AGPA project. Please note that the information contained in Appendix RR – an expression of interest letter does not lend itself to being copied with the proprietary or trade secret information redacted.